PROCEEDINGS

OF THE

TWENTY-NINTH ANNUAL MEETING

OF THE

FLORIDA STATE HORTICULTURAL SOCIETY

HELD AT

ARCADIA, FLA., APRIL 25, 26, 27, 28

1916

COMPILED BY THE SECRETARY
PUBLISHED BY THE SOCIETY

THE E. O. PAINTER PRINTING CO., DE LAND, FLA. N° 11114

CONSTITUTION

ARTICLE 1. This organization shall be known as The Florida State Horticultural Society, and its object shall be the advancement of Horticulture.

ARTICLE 2. Any person may become a member of the Society by subscribing to the Constitution and paying one dollar. Any person may become a Life Member of the Society by subscribing to the Constitution and paying ten dollars.

ARTICLE 3. Its officers shall consist of a President, three Vice-Presidents, Secretary, Treasurer, and Executive Committee of three, who shall be elected by ballot at each annual meeting. After the first election their term of office shall begin on the first day of January following their election.

ARTICLE 4. The regular annual meeting of this Society shall be held on the second Tuesday in April, except when otherwise ordered by the Executive Committee.

ARTICLE 5. The duties of the President, Vice-President, Secretary and Treasurer shall be such as usually devolve on those officers. The President, Secretary and Treasurer shall be ex-officio members of the Executive Committee.

ARTICLE 6. The Executive Committee shall have authority to act for the Society between annual meetings.

ARTICLE 7. The Constitution may be amended by a vote of two-thirds of the members present.

BY-LAWS

1. The Society year shall be co-extensive with the calendar year, and the annual dues of members shall be one dollar.

2. All bills authorized by the Society or its Executive Committee, for its legitimate expenses, shall be paid by the Secretary's draft on the Treasurer, O. K.'d by the President.

3. The meetings of the Society shall be devoted only to Horticultural topics, from scientific and practical standpoints, and the Presiding Officer shall rule out of order all motions, resolutions and discussions tending to commit the Society to partisan politics or mercantile ventures.

Florida State Horticultural Society

OFFICERS ELECT FOR 1916:

PRESIDENT:

H. HAROLD HUME, Glen St. Mary.

VICE-PRESIDENTS:

L. B. SKINNER, Dunedin.

W. J. KROME, Homestead.

S. F. POOLE, Winter Haven.

SECRETARY:

OKLE PAINTER WILLIAMS, Jacksonville.

TREASURER:

W. S. HART, Hawks Park.

EXECUTIVE COMMITTEE:

P. H. ROLFS, Gainesville; E. S. HUBBARD, Federal Point; ED. SCOTT, Arcadia.

President, Secretary and Treasurer, ex-officio.

Standing Committees

Methods of Packing and Shipping Citrus Fruits.—C. W. Barnes, Winter Haven, Fla.; E. P. Porcher, Cocoa, Fla.; W. J. Ellsworth, Blanton, Fla.; H. C. Schrader, Jacksonville, Fla.

Methods of Handling Citrus Groves.—J. A. Stevens, DeLand; H. E. Cornell, Winter Haven; W. F. Miller, Valrico; J. C. Chase, Jacksonville.

Peaches and Other Deciduous Fruits.—W. L. Floyd, Gainesville, Fla.; H. K. Miller, Monticello; A. C. Haynes, DeLand; Ira E. Soar, Dade City.

Vegetables. — James Brown, Hypoluxo, Fla.; T. J. Peters, Perrine; H. S. McLenden, Fort Pierce.

Insects and Diseases.—W. W. Yothers, Orlando; Dr. Hiram Bird, Princeton; J. R. Watson, Gainesville; H. E. Stevens, Gainesville.

Fertilizers.—L. B. Skinner, Dunedin; Dr. J. H. Ross, Winter Haven; W. J. Driscoll, Jacksonville.

Tropical Fruits and Pineapples.—R. L. Goodwin, Fort Pierce; Mrs. Florence P. Haden, Cocoanut Grove; Dr. John Gifford, Cocoanut Grove; James Britt, Eldred; B. K. McCarty, Eldred.

Avocados.—W. J. Krome, Homestead; Mrs. P. H. Rolfs, Gainesville; Dr. J. H. Montgomery, Miami; John B. Beach, West Palm Beach; E. N. Reasoner, Oneco; Edward Simmonds, Miami.

Ornamentals.—Miss Elizabeth Skinner, Dunedin; Dr. H. Nehrling, Gotha; H. S. Pennock, Jupiter; Dr. Mary B. Jewett, Florence Villa.

Orchard Heating.—R. E. Stevens, Daytona, Fla.; B. C. Skinner, Dunedin; S. C. Warner, Palatka.

Necrology. — E. S. Hubbard, Federal Point, Fla.; Edgar A. Wright, Tampa, Fla.

Legislative.—M. E. Gillett, Tampa, Fla.; T. Ralph Robinson, Terra Ceia, Fla.; G. L. Taber, Glen St. Mary, Fla.; I. A. Stewart, DeLand, Fla.; O. W. Conner, Tangerine, Fla.; Lloyd S. Tenny, Orlando, Fla.

List of Members

Honorary Members

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Hart, W. S., Hawks Park, Fla.
Hoyt, R. D., Clearwater, Fla.
Taber, Geo. L., Glen St. Mary, Fla.

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Bell, J. D., St. Petersburg, Fla.
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Frink, Aubrey, Berlin, Fla.

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Harris, E. K., East Palatka, Fla.
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Hill, E. M., Nueva Gerona, Isle of Pines.
Hollingsworth, G. S., Arcadia, Fla.
Hooper, I. A., Orlando, Fla.
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Mills, Dr. J. C., Orlando, Fla.
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Moseley, A. A., Winter Park, Fla.
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Myer, H. Van W., Cocoanut Grove, Fla.
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Gillett, D. C., Tampa, Fla.
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Gore, Mahlon, Orlando, Fla.
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Hamm, W. T., Palatka, Fla.
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Harrington, Mrs. C. W., Winter Haven, Fla.
Harrington, Mrs. Elizabeth, Williamantic, Conn., Camp Elizabeth.
Harris, W. F., Buckingham, Fla.
Haskins, R. G., Sebring, Fla.
Haynes, A. C., DeLand, Fla.
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Horton, C. E., Winter Haven, Fla.
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Hoskins, E. C., Orlando, Fla.
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Hubbard, Miss Edith L., Arlington, N. Y.
Hubbard, Mrs. E. S., Federal Point, Fla.
Hume, E. G., Glen St. Mary, Fla.
Hume, H. N., Glen St. Mary, Fla.
Hume, Mrs. E. N., Glen St. Mary, Fla.
Humphrys, A. S., Indianola, Fla.
Hutton, James, Fort Myers, Fla.

Inman, Mrs. Florence E., Florence Villa, Fla.
Inman, S. C., Florence Villa, Fla.

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Jones, H. G., Arcadia, Fla.
Jones, Ward M., Ames, Ia., Station A.
Julian, T. G., Lexington, Ky.
Justice, Mrs. Delia, Fort Pierce, Fla.

Kaps, Peter, Zephyrhills, Fla.
Kaufmann, E. J., Lakeland, Fla.
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Keck, E. C., Bowling Green, Fla.
Keck, Irving, Bowling Green, Fla.
Kellow, Frank, Fort Myers, Fla.
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Keiper, Frank, Rochester, N. Y., 37 Elwood Bldg.
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Kilgore, B. F., Largo, Fla.
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Kil-Tone Co., Newark, N. J., 169 Malvern St.
King, Wm., Avon Park, Fla.
King, W. G., St. Cloud, Fla.
Kime, C. D., Lakeland, Fla.
Klemm, Mrs. A. M., Winter Haven, Fla.
Klemm, A. Richard, Winter Haven, Fla.
Knauer, Mrs. Pearl Lee, Jacksonville, Fla., 743 W. Adams St.
Knox, L. B., Bulow, Fla.
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Laird, J. M., Micco, Fla.
Lane, E. B., Auburndale, Fla.
Lane, E. C., Winter Haven, Fla.
Lanier, Virgil H., Jacksonville, Fla.
Latting, W. L., Plant City, Fla.
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Livingston, J. L., Arcadia, Fla.
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Lytle, Mrs. E. B., Stanton, Fla.
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McCall, W. W., Lake Alfred, Fla.
McClemthan, Laura E., Sebring, Fla.
McClure, Carl C., Fort Myers, Fla.
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McCord, F. E., Stuart, Fla.
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McLaughlin, C. E., Fort Myers, Fla.
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McNichols, J. P., St. Lucie, Fla.
McQuaid, John H., Sparkman, Fla.
McQuarrie, C. K., Gainesville, Fla.

Mace, J. P., Lake Helen, Fla.
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Robinson, T. Ralph, Terra Ceia, Fla.
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Rood, E. B., Bradentown, Fla.
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Rose, Mrs. R. E., Tallahassee, Fla.
Rosin, S., Arcadia, Fla.
Ross, J. H., Winter Haven, Fla.
Ross, Mrs. J. H., Winter Haven, Fla.
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Rou, Mrs. S. F., Lowell, Fla.
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Turnley, W. D., Fort Meade, Fla.
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Warner, S. C., Palatka, Fla.
Webber, J. E., Winter Haven, Fla.

Wells, B. F., Arcadia, Fla.
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Wilson, Hon. John A., Bayamon, P. R.
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Zachar, Jerome, Racine, Wis., R. 1, Box 82.
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Zeluff, N. C., Gainesville, Fla.

740 members this yr.

Proceedings of the Twenty-Ninth Annual Meeting of the Florida State Horticultural Society

For several years the good people of Arcadia urged the members of the Horticultural Society to come visit them in fair Arcadia. There were many demurs and hesitations for fear we would not be able to get comfortable accommodations, etc. I think the Secretary expresses the sentiment of the 350 members who attended, when I say we have never been treated more royally, had better things set before us to eat or been served in a more gracious manner.

The good people themselves were untiring in their efforts to make our stay pleasant. Some special music was furnished at every session of the meeting. The school children of Arcadia of both the Grammar and High Schools sang for us on several occasions, and solos and duets were given by different members of the musical circles of Arcadia. One evening we were favored with several numbers by the orchestra of Punta Gorda.

The Commercial League entertained the members of the Society by a delightful ride on Thursday afternoon, giving the members an opportunity to see the big drainage system, orange groves and surrounding country. Following the automobile ride the Ladies' Civic League of Arcadia entertained the members on the High School grounds.

All during the session Mr. Trice, Superintendent of the Orphanage, and some of his boys served a delicious and invigorating drink made from the wonderful grape fruit.

On the arrival of the members at the Thursday evening session their attention was attracted to the collection of bird houses. Several weeks before, the DeSoto County High School instituted a contest in their Manual Training Department for making bird houses, and these various homes were on display. Mr. D. C. Gillett, of Tampa, presented the four medals. This is certainly a start in the right way, as it is urging our boys to protect rather than destroy one of the greatest sources of help the farmer and fruit grower has today—the birds.

Addresses of Welcome and Responses

ADDRESS OF WELCOME ON BEHALF OF ARCADIA

Judge A. F. Odlin

Mr. President, Ladies and Gentlemen:

We hear a great deal these days about preparedness. I do not like the word "preparedness"; I think the word preparation is a gool deal better, and the good old Anglo-Saxon word "readiness" is much better. But our new Secretary of War speaks of preparedness—I have the honor of knowing him personally; a man of small stature but big in brain and intellect. He speaks of preparedness, so I think it should be good enough for you and for me.

About two months ago, a friend of mine, Capt. Rowe, came to me and stated that I had been selected to address the members of the State Horticultural Society when they met here the last of April. I thanked him and told him I would do anything he might suggest. The matter came out in the daily press and the paper was brought to our home and several friends were gathered around, and I wish you could have heard some of the remarks. "The idea of asking a man like Odlin to address the Horticultural Society! He knows nothing about horticulture. He can't even run a lawn mower, and it seems strange that he should be selected to address horticulturists."

But I had one friend, little Dorothy King. She said, "But Mrs. Odlin has raised such beautiful nasturtiums." I presume it was on account of those flowers that I was called upon to address you. (Laughter.)

But I set to work conscientiously, and by diligent study was soon able to distinguish an oleander from a rose. (Laughter.)

About two weeks ago, Capt. Rowe said: "It seems they do not want you to speak about horticulture; they want you to deliver an address of welcome on behalf of the Mayor of the city." I said, "I know the Mayor, and our Mayor possesses very many excellent qualities, and he possesses one quality some mayors lack; there is no question about his patriotism, but he is a most modest man, and I know he does not care to address an audience, even of those who may know him."

I really think he could have addressed you and told you a good deal more about our town and county than I, because he has lived here longer than I, but inasmuch as I have been requested to welcome you in his behalf, I am very glad to have the opportunity of doing so, but it seems too

bad that all my efforts to master the subject of horticulture in two months, should be wasted, as I was not permitted to address you on that. I am sure you would have learned many valuable facts. (Laughter.)

Speaking about Arcadia and the community around Arcadia; I am sure no man could have had the experience I have personally had without becoming an optimist. I notice this is your twenty-ninth annual meeting. Twenty-nine years ago I came to the State of Florida. I think there is no possible connection between these two facts, my coming to Florida and the organization of your Society, but it is a singular coincidence. I located in Orange County, about one hundred and twenty miles north. A few years thereafter I visited Arcadia, and to see Arcadia then and compare it with the Arcadia of the present day, would make any one believe the world is surely growing better. The only brick building was the county jail, and if crime continues to decrease as it has since then, we will tear down the jail we now have, as we will have no use whatever for it. (Laughter.)

There were at that time, nine public barrooms and two churches. There are now no barrooms, and nine churches. (Applause.)

Comparing the conditions at the present time with those of twenty years ago, could we be other than hopeful for the future?

We are proud that your Society will have its deliberations here for the next few days, and we are certain that they will have an important bearing upon the future, not only of Florida, but upon our country at large.

As you know, the European world has been upset by a war that is wicked and horrible, and which many of us believe is causeless and unnecessary. I have taken pains to read the views of the wisest public men upon the results which are apt to follow this war whenever it ends. The views which seem to be most acceptable, are that we shall have no great panic, no great financial distress in this country, but that there must be a well established and serious effort made for a re-adjustment of the world's financial conditions. When we read there are 57,000 men in the employ of one concern engaged in the manufacture of munitions, when we read that the sum of $62,000,000 has been contracted for European soldiers alone, we can see that the re-adjustment conditions to follow are something that must be handled with great care and diligence.

It has been pointed out, in connection with these figures, that the percentage of persons engaged in this country in agriculture is 5% below the normal. We can see, if we can reason at all, that the necessity will arise that many of the people employed today in lines of activity growing out of the war, must turn directly or indirectly, to the soil in order to live.

We have in Florida today, more land capable of developing that is undeveloped and at a lower price than any other State in the Union. We have the best climate in the United States, in my judgment, and, I think, the best climate in the world except in one place, and that is Porto Rico and a portion of the Philippine Islands and possibly a few of the Sandwich Is-

lands; but certainly the best climate in the United States.

Taking these things into consideration, the opportunities that are presented here, the marvelous progress that has been made during the last five years, it is no surprise to us that people are beginning to realize the wonderful opportunities presented by the practice of agriculture and horticulture in this State.

And it seems to me the work of developing the State as it should be developed, lies largely in the hands of your organization, and we want you to know that Arcadia welcomes you here.

We can show you no such beautiful lakes as Orlando has, nor can we show you as fine streets and beautiful trees as Bartow and Lakeland have, but I think I can safely promise you, and I think you will find that you can select no place where you will meet with a warmer welcome than in this little town of Arcadia. (Applause.)

There are many towns in Florida that have had wonderful growth and development, but I doubt if you could select any town where you could see the improvement more marked than here, and not only the Mayor, for whom I speak, but every citizen of Arcadia, hopes your twenty-ninth annual meeting will be a success, and you will remember Arcadia most pleasantly, and all come again.

Thank you for your attention. (Applause.)

RESPONSE

L. B. Skinner

Mr. President, Ladies and Gentlemen:

I would like to go down in the audience and shake hands with every face I see here. That sounds funny, but I am sure you know what I mean. (Laughter.)

This is certainly some climate. As I sat in a chair there at the back of the stage, I felt something unusual at the back of my head, and put my hand up to see what it was, and found a palm blowing against the back of my head. I know it was not there when I sat down. Must have grown up in the meantime.

I was astonished to see what fine towns are growing up all along the line of railroad. I really could not recognize what these towns were. There were so many brightly lighted towns, with fine pavements and fine brick blocks in every direction. One of the men on the train said, "I wish I had come down in the day-time, so I could have seen them."

This gentleman who has just delivered such a boost for Arcadia, reminded me of a story I heard today; I think it was one of Myron Gillette's. There was a meeting of the school board at the school house at St. Paul some years ago. One of the members of the school board was a Swede; you know there are a great many foreigners in the middle west. There were seven members on the board, and the question

to be decided was whether they should allow the reading of the New Testament in the school. Three voted for it and three against it. The Swede would not vote; he said he had never read the book. So the meeting was postponed for a week or two so that he might read the book and be capable of voting so that the question might be decided. He went home and read the New Testament from cover to cover. When the meeting was called again and the question came up for decision, he voted against it. Of course, those in favor of having it read, wanted to know why he voted as he did. "Vell," he said, "Aye live in Minneapolis, and aye vould not vote for a book vhich boom Saint Paul an' say notting about Minneapolis." (Laughter.)

I really belong to Arcadia; you think that is not true, but it is. Arcadia is one of a circle of towns that is around Tampa; linked to Tampa by a spoke. Tampa is the hub, and on the other side is Dunedin, where I live. Do you ever think that we live, all linked together in a country of wonderful possibilities?

Now it is time for you to get mad; I am going to boom Tampa. (Laughter.)

You see your town of Arcadia, with its wonderful progress in the past, and its more wonderful possibilities for the future, which you are improving to the fullest extent. I have been in the State 33 years, and practically all of South Florida has grown in 33 years. Take Arcadia; you can duplicate its growth in a dozen towns in South Florida; look at Lakeland, Winter Haven, Florence Villa, Fort Meade, Wauchula, Fort Myers, Punta Gorda, and, in the other direction, Plant City, Dade City, Orlando, Sanford. They are all linked together with a wonderful bond. We are all living upon land that is rich and only the first inkling of its wealth has been realized. We are all living where we can grow palms at the back of your head just while you are thinking about it. (Laughter.)

Even at Haines City they can make things grow; you would not believe it, but they do. (Laughter.)

I do not want to keep you from the good things that are to come after.

I am reminded a little bit of an incident that happened when I was a boy. One of our neighbors had a father who never asked the blessing, and when his mother's father came to visit, he always asked enough to make up. This morning our friend was in a hurry to get out and play ball, and his grandfather started on the blessing, and kept on, and kept on. The boy fidgeted and wriggled, and finally could stand it no longer, so he said, "Grandfather, you need not be so long about it; there's nothing but hash." (Applause and laughter.)

ON BEHALF OF THE COMMERCIAL CLUB

C. H. Mitchell

Mr. President, Ladies and Gentlemen:

The subject of my address is this: The Commercial Club of Arcadia wish you mighty well. We extend to you the welcoming clasp of three hundred and fifty glad hands. May the blessed God purge all infection from our air, whilst you do climate with us.

I listened with closest attention to the cordial words of Judge Odlin; I gave no less hearing to the genial response from the gentleman from Dunedin. Since I came on the platform I have searched my mind with the one intent and hope that I would hear or see something that would enable me to begin my speech with my venerable old friend, "I am reminded of"— (Laughter.) But, alas! I have heard nothing, I have seen nothing that reminds me of anything. (Laughter.) I have nothing that makes the proper connection for the recital of any one of the long list of hoary headed jokes and anecdotes which have done service on so many occasions. So you are indebted to providential hindrances and lack of suggestion that you are freed from the infliction of the affliction of conventional and oftentimes cruel use of "I am reminded of"—

Mr. President, Ladies and Gentlemen: The subject of my address is this: The Commercial Club of Arcadia wish you mighty well. We extend to you the welcoming clasp of three hundred and fifty glad hands. May the blessed God purge all infection from our air, whilst you do climate with us.

Judge Odlin spoke for the whole of Arcadia; he is the representative of the Mayor and the City Council and the Civic League; he is the representative of every citizen of the community, good, bad and indifferent, from the cradle to the old armchair.

Speaking of cradles suggests babies, and speaking of babies—that reminds me. (Laughter.) A prominent candidate for a political office declared to me within the last few days that there are more babies and prettier babies and smarter babies in the town of Arcadia, than any other town in Florida. (Laughter.) I have it upon good authority that the sweetness and the beauty of our girls is a permanent endowment unto the third and fourth generation. They are as fresh and sweet as the sun-kissed dew from the sixteenth day to the twentieth summer, and then some. (Laughter.)

The subject of my address is this: The Commercial Club of Arcadia wish you mighty well. We extend to you the welcoming clasp of three hundred and fifty glad hands. May the blessed God purge all infection from our air whilst you do climate with us.

Maybe you want to know who and what our Commercial Club is. I am glad you asked the question. (Laughter.)

The Commercial Club of Arcadia is the best and largest and livest thing in the

city of Arcadia. The banner on the outer wall declares our interest in agriculture, in horticulture, in floriculture and in plain old "garden sass." (Laughter.) When we considered the employment of a secretary, we procured the services of a man, efficient and industrious, and handsomest and physically the largest gardener they had in Florida or any city.

The Commercial Club is a law-abiding institution, a law-upholding organization. When we went to select an executive head, we chose a man whose leadership was recognized, a man whose word would be law; our choice was unanimous for Judge Lynch. But our Lynch, bless your soul, is not related remotely or directly to that other notable Judge of a similar name that last year brought nineteen deplorable repetitions of crime upon a sister State.

The Commercial Club of Arcadia is a very important one, the personification of harmony and concord. There was a time in the arrogance of our youth when we thought we were big enough to have two such organizations, and we had two, because Arcadia always does what she sets out to do. But the majority of the membership in each club were married men, and through long years of experience they had been taught submission. Realizing the results that would come from the establishment of two heads of authority in the same household, it was deemed wiser to consolidate, and work together in harmony under one management. We called a union meeting and told the other fellow we never said it and never did it, and he said he never said it, and never did it, and we told each other we never said it and never did it. The result was we abandoned our distinctive organization, and I stand before you today, the representative of our Commercial Club of Arcadia, one body, bonded together by the idea of development of all our material interest, to maintain the very highest standard among our citizens. We are not selfish nor narrow in our aim, for what we do for Arcadia, we do for DeSoto County; what we do for DeSoto County, we do for South Florida. We are eager to render service and engage in activity that will need our good word and work, for the good of the great old commonwealth of Florida. (Applause.)

Now, I hope you understand the subject of my address. The Commercial Club of Arcadia wish you mighty well (Laughter). We extend to you the welcoming clasp of three hundred and fifty glad hands. May the blessed God purge from all infection the air, whilst you do climate with us.

That is the first division of my speech.

The second division was produced with very much labor and in the hope of winning your gracious approval, I will now proceed. You are very welcome to our midst, and it will appear in other ways than words.

Thank you for your courtesy.

RESPONSE FOR THE SOCIETY

D. C. Gillett, Tampa, Fla.

Mr. President, Ladies and Gentlemen:

Last year when the Horticultural Society decided in Tampa that this year's convention should be held at Arcadia, your loyal friends and supporters made very broad claims for your city and surrounding country. In fact, so extravagant were they in the use of adjectives setting forth the beauties of Arcadia that I am sure there was aroused in the minds of every man, myself included, a desire to visit Arcadia and partake of that hospitality for which you are famous.

We were told of your agricultural and horticultural resources, your phosphate and grazing lands, your schools and churches, your business institutions and citizenship, and last but not least, your beautiful women.

Since my arrival and casual observation of the surroundings I do not hesitate to say to you it is my opinion that the story was not half told. The picture was not painted in its brightest colors, and I am glad we are here mingling with Florida's most progressive citizens.

On behalf of the Florida State Horticultural Society, I thank the gentleman who has preceded me for his cordial welcome, and I am sure we shall enjoy our visit to the fullest extent and go home with warm spots in our hearts for every Arcadian.

Arcadia has been called a Cracker town. This, my friends, is a distinction of which you should be proud, and I am proud with you, for I am a Florida Cracker myself, country-born and town-reared, but corn-fed.

Arcadia has played an important part in shaping the destiny of our great State, and she numbers among her citizens men who have added more than their share to the upbuilding and development of Florida. One of your citizens who got his start here, is today one of the leading bankers of this State. I refer to Hon. J. J. Heard, who is a builder, a benefactor and a man who backs up his faith in Florida and her resources with his money. He has been a helper of deserving young men and in certain respects can be termed the savior of the naval stores industry—and he came from Arcadia.

Every man who has thought of the future knows that Florida is destined to be one of the greatest cattle-raising States in the Union—and we are going to raise our own feed, too. All of this was foreseen thirty or forty years ago by the late Ziba King, of Arcadia, and today his sons and grandsons are following in his footsteps and reaping the golden heritage of his foresight—and best of all, they are using their money in the upbuilding of their home town and for the promotion of enterprises that help its development.

Twenty years or more ago, when the lumber business in Florida was in its infancy, W. G. Wells located within a few miles of Arcadia. He went into the saw mill business and started an enterprise

which today is one of the leading business institutions in South Florida, and the money which he has made has been invested within the city limits of Arcadia. *That,* gentlemen, is true citizenship and tends to prove that Arcadia has been built up by men of faith and worth and unusual merit and energy.

About fifteen years ago Hon. John Burton was a young man just out of college. He qualified as a lawyer. He could have gone to Jacksonville, or Pensacola or Tampa, or a thousand other places. He chose Arcadia. Today he is the State's Attorney for one of our most important judicial circuits, and unless something unforeseen intervenes, it is my prediction that the day will come when his voice will be heard in the council of the nation.

There is no question that is receiving so much attention in Florida today as that of good roads, and there is no man in Florida who has done more effective work for good roads than the Hon. Ed. Scott, of Arcadia.

I could mention others, I could recite by the hour notable achievements which have been accomplished by Arcadians, but I have said enough to prove conclusively that your fair city is entitled to a place on the map of Florida and that her citizens have done their part towards the upbuilding of what is destined to be the greatest State in the Union.

Within the last few years there is no part of Florida that has shown more real development along agricultural and horticultural lines than DeSoto County. It is rich in natural resources. You have your naval stores and timber. You have your phosphate and grazing lands. You have a vast acreage that is excellently adapted to the raising of citrus fruits and early vegetables. You have ample capital, and above all, you have men of ability and faith. I therefore say it is very proper that the Florida State Horticultural Society should convene in Arcadia and exchange ideas of mutual advantage to all.

There are many agencies constantly at work building a greater and more united Florida. It is my belief that the word "Co-operation" is more responsible for our development than any other in the English language. We see on all sides, in all lines of business, a greater spirit of co-operation, and to my mind it is the keynote to our success. In my home city even our churches are getting together on a co-operative basis and recently held a revival for the purpose of injecting religion into the sinners, and after that was accomplished they were then given their choice as to which church they desired to affiliate with. The manufacturer, the lawyer, the banker, the doctor and, in fact, every line of business and profession are co-operating for the accomplishment of those things which will bring about the greatest good to the greatest number. Why should not the farmer and fruit grower co-operate? We find in our own midst such splendid organizations working for the development of the State as the East Coast Chamber of Commerce, the South Florida Chamber of Commerce and the "Florida First" Commission, each of which organization is doing its share in building a greater Florida. Coming down to our own interests, we have such splendid organizations as the Florida Citrus Exchange, the Florida Growers' and

Shippers' League and the Florida State Horticultural Society. Is there a man or woman within the sound of my voice who will say that these three co-operative agencies have not produced beneficial results to the farmers and fruit growers of this State? Those of you who can think back to the days prior to their existence have only to remember the conditions which existed then and now. A comparison is obvious.

I believe in co-operation because I think the combined strength, advice and counsel of a thousand men is better than my own. I am willing to contribute my small mite to the success and upbuilding of any organization which will tend to elevate and place on a higher plane the business from which I make my living. Has it ever occurred to you how much more efficient this Society could be to its members, or the Florida Citrus Exchange, or the Florida Growers' and Shippers' League if every one of the 11,000 citrus growers of this State were actively working for its advancement and welfare? There has never been a time in the history of Florida when co-operation was as necessary in solving our present-day problems. It is my sincere hope that out of this meeting at Arcadia may come a clearer understanding and a better feeling between all members and a full realization of the necessity for team work in handling the great problems which confront us in the conduct of our affairs.

If the native and adopted sons of Florida are going to place her in the front rank of civilization, if they are going to keep her apace with the times, co-operation from every source must be had, for then, and only then, will Florida's dream be realized.

I thank you.

Mr. Skinner: I am going to ask you to do something out of the usual, and that is, to rise and take out your handkerchief and salute the gentleman who is to deliver the next number on our program, Professor Harold Hume.

President's Annual Address

H. Harold Hume

Members of The Florida Horticultural Society, Ladies and Gentlemen:

If we stop to contrast the condition of the old time farmer, who in the immortal words of Gray, single handed and alone, "The little tyrant of his fields withstood," with the condition of his present time successor, we cannot but be impressed with the many highly efficient forces which are making for the uplift of the work in which we are individually and collectively interested. Certainly, no longer single handed, is it necessary to work out to a successful conclusion, the intricate problems of crop production. It is of course true that in many directions our difficulties have increased, both because of the greater variety and because of the larger quantities of crops produced, but the advantages at our disposal in a large measure offset these increases. When help is desired, there are many sources from which it may be secured.

Let us now inquire what agencies, operating in our State, may be brought to the assistance of the horticulturist and determine whether we are taking full advantage of them.

First among them is our Experiment Station. It took the Experiment Station of our State quite a number of years to measure up to the full sense of its opportunities and responsibilities. Into the causes for the condition, we need not enter, but maybe the life of an institution is much the same as the life of an individual, in that there must be years of preparation, and years of development and much misdirected or waste effort before the age of productive activity is reached. Happily for our State and for those of us who are interested in its horticultural industries, the Experiment Station has developed a wonderful breadth of view, it is attacking our problems with precision, it is well directed, well manned and well equipped, and the best part of it is that over the whole State, there has spread a feeling of confidence in the work which this institution is carrying on. More and more, people are turning to it for the assistance they must have, and their needs are being met.

Now the State Experiment Station and the Agricultural Department of our University are engaged in other lines of activity which are different from their direct lines of investigation and experimentation. The direction of forces which are working a revolution in our agriculture, rests with them. It does not need a prophet to foretell the uplift which is surely coming through the work of the county agents. This work is new, very new, and some time must pass before we

can have accurate knowledge of the results, but a trained and active agent in every county in Florida will bring about a wonderful change in our rural conditions within the next decade. These men are doing more in one year to put tested knowledge into operation than all the tons of educational literature have done in the past twenty-five. There has been nothing wrong in the main with the quality of this literature, but it is everlastingly true that we must learn how to do by doing. We have to be led to make an attempt, by the demonstrated success of others.

In connection with this rural uplift work, one of the important contributing forces has been the Farmers' Institute work. This organization has carried the gospel of good farming and better living with signal success, and it has opened the way for a larger usefulness on the part of the Experiment Station.

The work to which reference has just been made is affecting the older farmer, the man more or less fixed in his way of doing things, the rut follower among us. And while we have emphasized the value of this effort, this is not the best part of this rural activity. The most important part is the reaching of boys and girls in the rural communities through the various clubs. This club work, whether it has to do with growing corn, or raising pigs or growing and canning vegetables or fruits is having a far-reaching effect in every section where it has been rightly organized. It is arousing that interest on the part of the boys and girls in the common every day things of the farm for which every agricultural educator has hoped and wished, for years past. Not only that, but this work is the nucleus around which a new sense of community interest is developing. And better living and better citizenship are also surely following in its wake. This Club work seems capable of unlimited extension as time goes forward. One of the tragic things in so many of our rural communities is the woeful lack of fresh vegetables and fruit as a necessary part of the diet. The word tragic is used advisedly, because inefficiency, sickness and death are intimately connected with the lack of these necessities. The activities of these clubs are slowly but surely bringing about a transformation in a much needed direction—the direction of right living.

When we come to speak of the work accomplished by the Division of Chemistry in our State Department of Agriculture at Tallahassee, it is impossible to separate the office from the man, for the one might not be much without the other. And when we take note of the work accomplished for years past and still being so ably carried forward, we cannot but be impressed with the foresight, honesty of purpose and rare good judgment which has marked the management of this office. This work in a large measure has been educational, but it has also been of immense direct benefit in fertilizer, stock feed and human food control..

In passing from consideration of the State's direct activities we must not fail to refer to the office of the State Geologist, where important work has been done in our behalf in mapping the underground water or artesian areas of our State. The possession of this knowledge in years

gone by would have forestalled many a futile effort.

The United States Department of Agriculture has a number of organized forces at work in Florida. Time will not suffice for me to go into full details. But let me call your attention to the Plant Introduction Gardens at Miami and at Brooksville. We are not yet growing all the varied products that may be produced under our wonderfully varied soil and climate. All our important horticultural crops are introductions. Some very recent ones are noteworthy. Others are sure to follow. This plant introduction work means much to the development of our State.

To this we must add the other work of the Bureau of Plant Industry in the investigation of drug plants, and in plant diseases, the work of the Bureau of Entomology, particularly as applied to citrus and pecan insects. Would that the lessons in the production of bright citrus fruits could be driven home! We have known these things so long. Oh! When will we wake up.

Let mention be made of one more thing which the United States Department of Agriculture is earnestly trying to forward in our State. It may not appear to interest us who are growers of fruits and vegetables, but which is none the less of vast economic importance to everyone interested directly or indirectly in the uplift of Florida—the destruction of the Cattle Tick. Can't be done? Can be done and it must and will be done.

The Florida Growers' and Shippers' League, born of a distinct need, has performed a signal service to this State and has most certainly justified its coming into existence, a service large enough to justify its existence for all time. And here again, it is not possible to separate the organization from the man or the man from the organization. It is not our purpose to detail its activities, but that you may get a measure of them in an instant, answer the question, where would the Citrus Industry of Florida be today had it not been for the work of Lloyd S. Tenny?

The newest organized force, operating in our interest is the State Plant Board. The creation of this institution had been looked forward to for many years. It came into existence sooner than some of us expected, although it well nigh took a calamity to bring it about. It now appears that the choice of the personnel of this Board was a peculiarly happy one. The organization is well perfected and it now appears that this Board will render a great benefit to our agricultural industries. Already it has performed a signal service along the lines for which it was created—a distinct token of what is to follow. Funds have been secured for the furtherance of its labors and its hands strengthened by men who have performed an outstanding public service. Reference is made particularly to the work of the Citrus Canker Committee and our public-spirited citizen who headed it, Mr. D. C. Gillette.

Now, my object in bringing these forces working in our behalf for the uplift of Florida horticulture to your attention are two-fold. First, to urge upon you the necessity for making use of the power which they can supply, power which if applied to your problems will make their solution

easier. More and more, agriculture is becoming a highly organized, specialized and complicated industry, and if we would succeed in our State we must lay hold on these forces which are operating in our behalf. Those among us who do not bring to our work a degree of skill, and a measure of knowledge, heretofore perchance not necessary, is bound to fall behind and pass out of the field. We have, besides, deep reason to be concerned about the position of our State in the horticultural field. Would we make the name Florida stand for all that is best in fruit and vegetable lines, then we must bring the vast amount of available tested knowledge to bear on the work to which we have given our hand. Second, I want to urge upon you the necessity for your hearty co-operation with these forces. Lend them every assistance possible in so many ways that need not be entered upon. Give them your loyal support, not your harsh and usually unfair criticism. Be a builder, and a booster; strengthen their work in every way, help them to advance, and by so doing we may always feel that we have within our borders forces which may be marshalled in the interest of our efficiency. Conditions around us are undergoing changes which at this time it is impossible to measure, and if we would succeed in the fullest measure we must be prepared to meet these changing conditions as they arise. There is no more important thing that we can do at this time than to lay hold on our State's agricultural uplift forces and help them as they will surely help us.

The Present Need of Florida Horticulture

P. H. Rolfs

Mr. President, Ladies and Gentlemen:

It is now two years since I have appeared on the program of the Florida State Horticultural Society. I am glad to be before you this morning and to meet again so many of my friends. This is the twenty-ninth annual meeting of the Horticultural Society. I have been a rather regular attendant on the program since the fifth meeting. I believe I have missed only three meetings since the one that I attended at Ormond. If this is correct, this will make my twenty-first annual meeting with the many men and women whose first interest is the Florida State Horticultural Society. Two years ago I gave a quarter-century review of the progress of horticulture in Florida. The progress that we have made during these twenty-five years is such as we may well be proud of. But with all of the great progress we have made there are still many things left undone. Many of these things we could accomplish if the united efforts we resolve to make at the annual meetings were carried out during the entire year.

PROGRESS IN SCIENTIFIC WORK

In 1891 the citrus industry of Florida was a lusty infant industry. The Horticultural Society was at that time reckoned as one of the leading societies of this kind in the United States. I am glad to say that its prestige at the present time is fully equal to that of twenty-five years ago. At that time there were only three scientific workers in the citrus field who were being retained for that special purpose. These were our departed friend, Henry G. Hubbard, Walter T. Swingle, and myself. Just how much money was at the disposal of these three workers I am unable to say, but certainly not more than six or seven thousand dollars, including their salaries.

When we compare these three young men—tyros, amateurs, or whatever you wish to call them—with the force of today, we are likely to look upon their efforts as almost worthless. As a matter of fact that many men of equal ability and the money at their command might be taken out of the State today and the vacancy would hardly be noticeable.

At the Experiment Station alone we have at the present time Professors Floyd, Watson, Stevens, Collison and Walker giving nearly all of their time to investigations connected with the health and diseases of citrus trees. In addition to these men who have done so much for us in the way of discovering new agencies we have a considerable number of workers directly from the United States Depart-

ment of Agriculture, who are giving much, or all, of their time to the investigation of citrus problems. The Plant Introduction Garden at Miami has been directing much attention in this channel. The Plant Introduction Garden at Brooksville has done more or less in this sphere. Mr. Samuel Hood has given special attention to the essential oils, to some extent other by-products of the citrus industry. Mr. Hood has made some splendid additions to our knowledge on this question. In connection with citrus insects and diseases my mind turns at once to Mr. Yothers, located at Orlando. Mr. Yothers has done a large amount of good work and will continue to give us the benefit of his experience. Quite recently Dr. Fulton has been sent to the State as an investigator in citrus diseases. I have mentioned five different lines of work that are being carried out by the United States Department of Agriculture in the State, that bear directly upon the citrus industry.

In addition to the workers I have already mentioned, who are essentially investigators, we have a force of County Agents who are located in fifteen of the citrus-producing counties. The special duty of the County Agent is to bring the truths discovered by the investigators to the attention of the horticulturist and the agriculturist.

The office of the State Chemist has now working in it four specially trained men, whose services are at the disposal of the citrus growers at any time. These men are invaluable to the State and I am pleased to know that the horticulturists of the State regard their services so highly as to make it well nigh impossible for any of them to get a day off.

The latest organization that has come to the assistance of the citrus industry in Florida is the Plant Board. The immediate occasion for the establishment of the Plant Board was the outbreak of citrus canker. Had the legislature of Florida listened to the advice received from the Horticultural Society no such outbreak as that of citrus canker in the State would have been possible. It seemed, however, that some dire calamity had to make itself felt before the entire people of the State could be aroused to the danger under which we are living. The Plant Board, in co-operation with the United States Department of Agriculture, has now in the field a force of about two hundred men. These are trained specialists with but one object in view, that of protecting the plant interests of the State.

I have now given you a brief review, showing in the shortest possible time the most important factors that are aiding the citrus growers from an official standpoint.

In addition to the official work that is being done in the State we have some private organizations that are making for the advancement of the citrus industry. The Growers & Shippers League, headed by Mr. Tenny, is doing splendid and effective work. This organization has had a place on the program of the Horticultural Society. It has been welcomed and been given all the assistance and comfort possible.

The Citrus Exchange, organized a little more than six years ago, has had a profound effect upon the improvement of the

marketing side of Florida citrus fruit growing.

THINGS TO BE DONE

The foregoing brief resume of the organizations in the field of scientific workers and extension workers, gives you a fair idea as to what has been accomplished and what is being done for the advancement of the citrus industry in the State. Taken from the standpoint of the knowledge of twenty-five years ago it would seem that everything had been done that could possibly be needed. There are, however, some very important lines of development still awaiting the opportunity of a genius or a hard worker to attack.

Probably one of the most notable and flagrant omissions in this direction is the waste of our citrus by-products. I know a considerable amount of this waste citrus product is being utilized, and for an American people we are probably doing quite well. There is, however, enough citrus fruit being wasted every year to make a very handsome profit on the undertaking of saving it. I will not worry you with statistics to show how much money we are losing annually by the importation of marmalade, citric acid, orange oil, and other materials of that kind. Mr. Samuel Hood has presented these figures to us from time to time. The point I want to make, however, in my speech today is that there is a splendid opportunity for the broad gauge man or woman to take up this work on a large scale. Methods have been perfected for the extraction of the oil; methods have been perfected for preserving the juice and methods are being perfected for preserving the pectins. Marmalade has been made for a long time, but so far as I know no one in Florida has attempted to bring the scattered fragments of this industry together and unite it in one whole, productive organization. There is at this moment a fine opportunity for someone who can control the capital and at the same time possesses organizing ability, to produce a splendid lot of this product and put it in such shape as the market will prefer. Such a work could not be done in a small way, nor could it be handled by commanding a few thousand dollars. There is a lot of work still to be done in perfecting the methods of preserving the juice, preparing the pectins and making citrus jellies, citrus acid and all the other by-products. The foundation of this work is well laid. The work to be carried out successfully would need to take into consideration all these various elements. No one of them in itself yields sufficient profit to enable it to stand by itself. Failures are made by adhering to one product plan.

CO-OPERATIVE ORGANIZATIONS

The only direction in which Florida horticulture is notably weak is its co-operative organizations. This became painfully evident to those of us who more than fifteen years ago attempted to have the legislature pass a crop pest law. It was not until 1911 that a sufficient amount of interest was taken in this work co-operatively to enable us to pass even a weak nursery inspection law. If it had not been for the presence of this nursery inspection law upon our statute books, there

would be no question but citrus canker would now be present in every citrus growing county in the State. It would have been so widely and thoroughly disseminated that it would be impossible to eradicate the pest at all.

There is nothing inherently in the growing of citrus to make a man a strong individualist. There is no finer co-operative organization than the California Citrus Exchange. The Florida Citrus Exchange has also shown that the Florida citrus growers can come together to a certain point and form a co-operative organization. The Growers & Shippers League has also shown that co-operation to a certain extent is not only possible but profitable. With all the progress we have made, however, in co-operative work in the State, we are still far behind the leading horticultural states in their co-operative work.

It has been established beyond question of doubt that co-operative work in Florida is possible and also very profitable. Starting out with the nucleus of less than five thousand dollars, I succeeded in getting the co-operation of the United States Department of Agriculture in what was known as the Demonstration Work. By proper handling of the co-operation the work was extended to many counties in the State. The Smith-Lever Agricultural Extension Law calls directly for co-operation between the United States and the various States. We have established the co-operative demonstration work with not less than thirty-five counties for men's work, and twenty-eight counties for women's work. In all of these cases the counties or local communities bear their proportional share of the expenses involved in this co-operation.

CONCLUSION

We are neglecting to save a product worth many hundreds of thousands of dollars that might be made from our culls. Co-operation and organization are necessary to save it.

Co-operation and organization are more necessary for the horticultural interests than ever before.

Report of Committee on Methods of Handling Citrus Groves

SOME OBSERVATION ON THE USE OF GROUND LIMESTONE IN THE GROVE

B. F. Floyd, Gainesville

During recent years, the use of ground limestone on the citrus soils of Florida to correct acidity has become quite general. The benefits to be derived from its use have been unquestioned. It improves the physical condition of the soil. It supplies the base which is so often lacking. It makes available more or less plant food. It fixes other foods so that they are not lost through leaching. It improves the biological conditions in the soil. And, finally, it supplies the plant food, calcium.

In practice, the limestone is usually used irrespective of all soil conditions except acidity. It is used on new soils and on old soils; on dry soils and on wet soils; on soils rich in humus and organic matter, and on soils lacking in these constituents. It is used with the idea that excessive quantities are harmless, and that it may be applied at any time of year except coincident with the application of fertilizer. Recently, however, some growers have obtained results from the use of limestone in their groves which indicate (1) that under certain limited conditions the use of ground limestone has proved detrimental to growth; and (2) that in the past, where such injury has occurred, it has been overlooked because it was attributed to other causes. On September 22, 1913, Mr. W. L. Drew of Winter Haven, Florida, addressed the director of the Experiment Station as follows:

"I have had an unexpected experience in causing frenching by the use of crushed limestone.

"I have at Winter Haven, my own grove of 25 1-2 acres, and joining it I have charge of my brother's grove of 16 1-2 acres. Twenty-eight rows of trees in this latter grove are Duncan grapefruit. Each row contains nineteen trees. Fourteen rows are on rough lemon roots and fourteen on sour orange roots. These trees were set in December, 1910. The trees of the two adjoining rows, the last row on rough lemon and the first row on sour orange, were set in soil with which there had been mixed a liberal quantity of ground limestone. No lime of any kind has, up to the present time, been used in any other portion of the

grove. The trees where the limestone was used showed no difference in growth or appearance from the other trees during the first summer—the summer of 1911.

"On May 10, 1912, we scattered a liberal quantity of the ground limestone around the trees of these two rows, and all over the middle between the two rows. In the summer of 1912 we failed to observe any effects of the ground limestone in the trees that were on rough lemon roots. The trees of the row on sour orange seemed to be growing a little faster and looked a little thriftier than the remainder of the trees on that root. I did not see the trees from September, 1912, to July, 1913. At this time both of these treated rows showed a large amount of frenching in great contrast with the trees on either side that showed almost none at all. I took three men at different times out to see the grove and telling them of this experiment with ground limestone asked them to point out the rows. This each one did, without hesitation, long before he had reached them.

"The grove is situated on good average high pine land of the Winter Haven region. All of the trees have had the same care and fertilizer from the first. As there is no difference in the character of the land where these two rows are, it is evident that the limestone has caused the frenching. It may be that where limestone is used, a fertilizer of a different character should be used. I can hardly believe that the lime itself has been injurious, and so I suspect it to be the lime and fertilizer combined. This leads me to state how the trees have been fertilized. I don't know now what fertilizer was used the first year. Since then, they have been fertilized as follows:

"March, 1912—4-6-6 from sulphate of ammonia, sulphate of potash, dissolved bone black, blood and bone tankage.

"June, 1912—4-6-6 from same source, about 1 pound per tree.

"August, 1912—4-6-12 from sulphate of ammonia, sulphate of potash, acid phosphate; a little over 1 pound per tree.

"February, 1913—5-6-6 from sulphate of ammonia, sulphate of potash, dissolved bone black; a little over 2 pounds per tree.

"June, 1913—5-6-5 from nitrate of soda, sulphate of ammonia, tobacco stems, steamed bone flour, dissolved bone black, sulphate of potash; about 2 3-4 pounds per tree.

"August, 1913—5-6-5 from the same source. 2 pounds plus per tree.

"Beggarweed is the cover crop in this grove. I might add as a result of this experiment and another previously made, that it is clear that on this land, where no fertilizer is applied beggarweed is not benefited by an application of ground limestone. I hesitate to state that it is injured, but such seems to be the fact. There are spots all over both of these groves where the beggarweed frenches and does not grow well, at least in the absence of fertilizer, and this condition seems more pronounced where the ground limestone has been applied."

The condition described by Mr. Drew still persists.

(Winter 1915). The trees have the appearance of suffering from withertip. The foliage is sparse, giving the tree an open appearance. The leaves are for the most part undersized. The branches are

more or less upright and defoliated near the tips. Leaves back of the tips show types of yellowing that vary from ordinary mottling to almost complete yellowing. Towards the base of the branches, the leaves show less frenching and in some cases, the lower leaves show a deep green color without any mottling. Defoliated terminal branches scattered over the trees show multiple buds in different stages of development. The bark of the trees has a more or less hide-bound appearance. The fibrous roots show few white tips. The majority of them are brown in color and dead.

The injury also persists in the soil. The cover crop has persistently refused to grow. A cover crop of cow peas was planted in the summer of 1915. The plants came up, made a scant growth, became sick and died. A few weeks ago (April, 1916) the area between the rows stood out in strong contrast with that in the remainder of the grove. Following a rain and a period of non-cultivation the cover-crop seedlings were coming up plentifully through the grove. But none were evident between the two rows where the limestone had been applied, excepting at one end where stable manure had been applied in the spring of 1915.

OTHER GROVES AFFECTED

During the last two years a number of other groves have been reported where apparently some injury has been induced through the improper use of ground limestone. These groves are located near Winter Haven, Largo, and other points. Since the ground limestone was spread over the whole of the groves in these cases, it is not at all so clearly evident that the limestone is the disturbing factor as in the case of the Drew grove where it was only spread between two rows through the grove. The conclusion that the limestone was the disturbing factor in these cases, is based on the following similarities in the Drew grove:

(1) Limestone was applied in rather large quantities.

(2) Similar soil conditions. The soils were rather open dry sandy soils lacking in humus.

(3) Similar development of the trouble. The first effect, after the addition of the limestone, was a stimulation of growth. This was followed, after a period of several months, by the development of frenching, lack of growth and finally a general starved withertip appearance of the trees.

(4) Similar appearance of the trees.

(5) A similar injury to the cover crop. In some cases, the plants would not grow at all. In others, after making some growth, they became frenched and died.

CONDITIONS UNDER WHICH INJURY MAY OCCUR

That ground limestone can induce injury only under limited conditions, is evident from grove practice. It is used widely through the State, but in only a comparatively few instances has injury been found. A review of the conditions in the groves mentioned above indicates that the conditions necessary for the injury are—the use of the limestone in quantity on a rather open dry sandy soil

lacking in humus, in connection with the use of strictly mineral fertilizers and the growth of little or no cover crop, or the repeated cutting and removal of the cover crop for hay.

There are several possible explanations as to how the limestone may cause the injury. It might be due to a condition of soil depletion brought about by the rapid action of the soil organisms upon the limited quantities of organic matter in the soil. It is a known fact that limestone stimulates the action of these organisms. Through such action much plant food is made available that may be lost through leaching. Such action is indicated by the increased growth of the trees on the sour stock. It is further indicated by the delayed appearance of the injury after the application of the limestone.

Another explanation might be the disturbance of the mineral nutrition of the plant by the lime added to the soil. Gile (Porto Rican Exp. Station, Bull. 11, Relation of Calcareous Soils to Pineapple Chlorosis) has found that the failure of pineapples with the appearance of chlorosis (frenching), on certain areas of that island was due to an excessive amount of carbonate of lime in the soil. The lime reduced the availability of the iron in the soil, so that the plant absorbed an excessive amount of lime and an insufficient amount of iron. This reduced the ability of the plant to form chlorophyll, which in turn led to further injury and finally the death of the plant. For ordinary sandy soils, about 2% of calcium carbonate rendered them unsuitable for pineapples. Smaller amounts than this did not appear to be injurious. Soils comprised principally of organic matter and containing as high as 40% of calcium carbonate produced vigorous plants.

Gile was able to produce the trouble readily by the addition of large quantities of lime to the soil.

PREVENTION AND REMEDY

That limestone was the cause of the injury to the trees and to the cover crop in the Drew grove, seems quite certain. That it was the cause of the trouble in the other groves, is only probable. Further observations and experiments are necessary to prove that the ground limestone is the injurious factor and to determine definitely the conditions under which it will occur. In the meantime, if the grower would play safe, he will use the limestone with care upon new lands and dry sandy lands that are lacking in humus. In all cases where he uses ground limestone in his grove and where conditions will permit, he will maintain or increase the humus content of the soil by growing and turning under a cover crop each year. In some cases, where the cover crop is cut and removed for hay, the stubble, roots and second growth are not sufficient to maintain the humus content of the soil.

Where injury has occurred, there is evidence which indicates that the following practices will be helpful for bringing the trees and soil back to a normal condition:

(1) Severe pruning of the trees.

(2) The use of limited quantities of organic sources in the fertilizers applied.

(3) A light application of stable manure spread widely.

(4) Planting a cover crop of cow peas, velvet beans or beggarweed.

(5) Turning under the entire cover crop after it is dead.

Discussion

Mr. Hume: While this Number 11 has to deal entirely with the methods of handling citrus groves, each of the members of the committee has selected an entirely different phase of the subject. I think, therefore, it would be best to discuss these topics separately. We will present this paper now for discussion.

Mr. Mead: I wish to mention, however, that certain growers have used ground limestone on Florida land and claim to have lost $20,000, but after cultivation for two or three years, the ill effects seem to have passed away. The authorities seem to think the bad effect was not due to the limestone, although they cannot state definitely what caused the trouble.

Mr. Sample: I would like to ask if the Florida soils show a deficiency in lime? Would it, in your opinion, be advisable to use ground limestone rock on new land, that is, where the growth is only what we call "wire grass?"

Mr. Floyd: Florida soils are for the most part deficient in lime. If the "wire grass" land is dry and lacking in humus, it would be safer to grow a cover crop and turn it under before applying the ground limestone. The application of low grade organic fertilizers would probably answer the same purpose.

Ground limestone, added to the soil, stimulates the activity of the soil organisms. Where ground limestone has induced injury to plant growth, it is presumed that this injury is not a direct one, but it is one that has arisen indirectly through the ultimate effect that the ground limestone has had upon the activity of the organisms in a soil deficient in humus or humus making materials.

The injury is apparently avoided by the presence of a sufficient amount of residual organic matter or humus in the soil; or through the addition of humus making materials to the soil by the growth and turning under of a cover crop or the use of low grade organic fertilizer sources. The injury can probably be remedied by the addition of humus making materials to the soil and the addition of small amounts of stable manure for the purpose of inoculation.

Mr. Skinner: Would it make any difference whether the ground limestone was power ground limestone or water ground limestone, and whether it was made up from sweepings around a lime kiln, where lime had been burned, or air slacked? The action of these two types of ground limestone is very different.

Mr. Floyd: The finer the limestone is ground the quicker is its action, within certain limits. Burned lime and air slacked lime act in the same manner as ground limestone, only they act more quickly.

If the ground limestone contains some burned or air slacked lime as an impurity, the action of the limestone upon the soil

would probably be hastened in proportion to the amount of the impurity present.

Mr. ——: I would like to ask how long before the application would it be safe to make an application of straight regular formula fertilizer? If the action of the ground limestone is so slow, why wait two weeks?

Mr. Floyd: Mr. Rolfs states in Press Bulletin No. 288 of the Florida Agricultural Experiment Station, "it is best to apply ground limestone to the soil a considerable time before the crop is to be planted. The application should be made before plowing, as this will give an opportunity to incorporate the material more evenly with the soil and will give the beneficial soil organisms an opportunity to increase to larger numbers.

"If it has not been possible to apply the ground limestone before the soil is broken up, it may be applied before planting time. It is advisable, however, to apply it a considerable time before one wishes to use fertilizer, since the acid phosphate of the fertilizer, on coming in contact with the ground limestone, is likely to be reverted more quickly than desirable.

Mr. Sample: I think the question is answered in the literature that when you use quick lime or rock lime you wait two weeks, but I do not think it should be necessary to wait any time when using ground limestone rock. I have used a great deal and that has been my experience.

Mr. Hart: I would like to ask if the same rule would apply in the application of ground phosphate rock. I understand that it is heated and therefore a good deal of the lime is available immediately. Would an application two weeks after applying nitrogenous fertilizers, be sufficient for that?

Mr. Hume: Mr. Floyd prefers not to discuss this question. Is there anyone here who is able to answer that question?

Mr. Hart: Mr. Dade is present, I think he could say a word on that matter.

Mr. Dade: I think at least two weeks. A good deal would depend on the amount of moisture in the soil. If your land is moist, I think the action would be quicker.

Mr. Burton: Following information I obtained from the Agricultural College at Gainesville, I made an application of ground lime to my grove. The grove was killed back in '90 by a freeze. It has had fairly good cover crops up until the last year. My trees are twenty-two feet apart. I made an application of about two and a quarter tons of crushed lime to that grove. Information I had received coming from the Experimental Station and otherwise advised the use of crushed lime. Now you have me guessing and wondering, since you come and contradict this, as to whether or not I am to expect good or bad results from the application of two and a quarter tons to my grove.

Mr. Floyd. I think that you must have gathered the wrong idea from my paper. The Experiment Station is still advocating the use of crushed lime in groves, but is advising its use with care or not at all in groves where the soil is lacking in humus or the grove practices are such that the humus in the soil is not maintained after the limestone is applied.

Not knowing the conditions in your

grove, I am quite unable to say what you are to expect from the use of the limestone therein. We have thus far observed no cases of injury in groves older than ten years of age. If the soil in your grove is well supplied with humus and if your practices are such as to maintain this supply, I do not think that, from the information we have at hand at the present time concerning the effects of limestone, you should expect injury. The lack of growth of the cover crop in your grove may be due to other causes. However, I should call your attention to the great need for carefully conducted and exhaustive experiments with the use of ground limestone on the different soils and with the different crops grown in this State. Our present information concerning the effects of ground limestone on citrus soils and citrus trees is derived entirely from grove practice. There is doubtless much to be learned concerning the effects of this material upon the soils and crops of our State, where conditions are quite different from those in the states to the north of us.

Mr. ——: How long will it take for lime to become neutralized so that it will do no damage?

Mr. Floyd: The manner and conditions under which ground limestone can induce injury are not sufficiently well known to answer this question definitely. It will probably take two or more years to bring a grove that has been badly injured, back into normal condition.

Mr. ——: Do you think it would be a good idea to reduce cultivation as one of the methods for bringing an injured grove back into normal condition?

Mr. Floyd: I am of the opinion that the cultivation should be reduced to the minimum. That is, plow the grove once each year in the fall, winter or early spring to turn under the cover crop. Run the harrow only when it is necessary to conserve moisture.

Mr. ——: In my grove the roots were probably forty years old. Part of the grove had withertip, and I put on about fourteen tons of ground lime in October a year ago. I do not see that the trees have improved at all. Do you think that I have put on too much?

Mr. Floyd: I do not know. Much depends upon the soil conditions in your grove before and since applying the limestone.

Ground limestone is not a cure for all tree troubles. I do not know that you should expect your trees to show recovery from the withertip condition from the use of the limestone. It might or might not be helpful in this respect depending entirely upon other conditions such as the amount and kind of fertilizers used, thoroughness with which the pruning had been done, etc.

Mr. Shepherd: I have read somewhere that on good Florida land there are 30,000 pounds of lime to the acre for the first foot. I do not think there is ever too much lime on your land to hurt. I think there is some other factor at work.

To produce the humus in your groves, grow humus. Too many growers think the groves should be kept clean. I know a section of the country where the cover crop of a young grove is kept off all the time. The trees are more or less frenched and have withertip. This is caused by

working that ground in the summer time with the hot sunlight and scalding rain falling on it. Let the grove be cultivated during the spring. That stimulates root development; then, in the rainy season, stop cultivating and go fishing; keep out and let the grass grow. My object is to get rid of the grass in the fall and winter. I can hardly find my grove in September at all.

Where a man has a dead piece of land, an application of stable manure will do more good than anything else to bring back the nitrifying element again.

L. D. Niles

Mr. President, Ladies and Gentlemen:

When applying rules for operating a large grove, it should be remembered that fruit growing is a game of emergencies, and that set rules and a rutted system of grove administration are noted first aids to failure. Always, the grower must be on the alert for new, unexpected conditions; and the ability to make quick decisions, and getting them into prompt, resourceful operation, are necessary requirements for the successful man.

For illustration: The owner of a large acreage who tries to follow the example of the average grower, with fifty acres or less, soon discovers conditions similar to the city man, who, making such a profit with ten hens on his back lot, figured out a quick road to wealth, bought a chicken farm and one thousand hens—and received a great many delusions almost simultaneously.

Problems immediately confronting this owner will be, Proper Cultivation, Fertilization, Spraying and Individual Tree Treatment, which is becoming more necessary in every grove.

After the crop of fruit is matured, providing he is wise enough to become an Exchange member—thank Goodness, one problem has been solved—and he has nothing to do but stay on the job and keep that fruit bright while preparing for the next crop.

Machinery has come to the aid of the grower in almost bewildering array, greatly reducing his dependence upon unskilled labor. At Lucerne Park, after trying out several Tractors, we have found a machine, which after a year's work in actual grove service, is giving such good results, that we are now using two for regular cultivation. Pulling double action Cutaways, specially designed Acmes, and a new weeder made by the Acme people.

These machines are doing excellent work, and at a reduced cost per acre as compared with the same work done by mules. However, in buying a tractor for grove work, one must take into consideration the distance apart trees are planted, and size of fields. Be reasonably sure it will overcome the conditions existing in your own grove, be positive it will deliver satisfactory drawbar pull in the softest places, and that it will turn without trouble among the trees, doing so without digging a great hole in the ground and thereby ruining your trees. Then, get a surplus of power, enough to do the work required without overloading.

During the dry season nothing takes the place of constant cultivation; keeping the surface of the ground stirred is the best

substitute for rain, during a drought like Florida has recently passed through; the average grove owner is inclined to wait until the trees are showing signs of needing moisture before becoming alarmed, and when there is a sure enough dry spell it is then everlastingly too late, evaporation can only be retarded by the cultivation and when lost can not be regained.

One very important fact in favor of a tractor is, its ability to work overtime in an emergency, by using an extra operator. This feature is one that highly recommends it, and is almost equivalent to having an extra outfit of men and stock at such times. In several instances during dry, hot spells, we have worked our tractors double shift, and invariably during these times, the men and teams cultivating, were unable to do an average day's work on account of the weather conditions, while the tractors had no difficulty in covering nearly double their usual acreage.

Spraying is a live problem for all growers, but at present the small grower has the advantage, for the machines are especially designed to meet his requirements. They principally consist of an endless variety of pressure pumps, driven by a small complicated gasoline engine, and mounted, with all accessories, on a truck, making all told some hundred different parts for the repair man to keep track of. And as most manufacturers claim that each and every part in their machine is separate and distinct from that made by any other factory, any one who is familiar with the cranky disposition of the usual small gasoline engine, can figure out what is coming to the man who will have to install a small fleet of this type of spraying machines to take care of his acreage. At present we are overcoming this in a way, by making up spray outfits; using a standard pump and accessories, driven by an H. O. type engine which uses kerosene oil, both starting and running. This eliminates such trouble makers as spark plugs, batteries, carburators and all electric ignition; in addition, it affects a great saving in the fuel used. However, I feel satisfied that in the near future, the spraying problem for large groves will be solved by compressed air.

Discussion

Mr. Thompson: I would just add one word to what he has said in regard to spraying. Our system of spraying is with the compressed air. It is a simple arrangement. We have a central pumping station where all the liquids are mixed and tanks are filled with compressed air by an air compressor, and when the men start out it is only a question of one man, a mule and a cart with fifty gallons. There is a pressure of about 175 pounds and he goes until that fifty gallons is used up. He comes back and another cart is all ready to hook on. We think that is the best system we have ever used. If anyone is interested enough to come to see it we will take pleasure in showing how it works.

Mr. Hume: In this same connection I was interested in some work I saw a day or two ago, and I would like Mr. Brown to tell us how he handles the spray.

Mr. Brown: I am not prepared, but I can try. We use a two and a half horse power gasoline engine. We have a two-hundred-gallon tank divided so that there is 100 gallons in either end, and with our system of irrigation we are never more than fifty feet away from a hydrant, so that in our grove of over two hundred acres we can start out team at one end of the grove and go three-fourths of a mile without leaving that main. We use eight lines of hose; we use a three-fourths inch main, covering three rows on one side and on the other side covering four rows and the row where the team is.

At the head we have a team which carries the stock solution and as we go across the grove they are carrying along eight lines of hose. The only stop we make is where we have sprayed one hundred feet either way, north and south, we have to detach our laterals which are 100 feet in length and bring the main in and then carry the main out on either side and attach the 100-foot laterals. This change takes about seven minutes, usually. This has worked out very well.

If we had to go any distance at all for water, it would be an almost endless task to spray trees that cover thirty feet. But we have our irrigation system and laterals on every third row and we never go fifty feet away from a hydrant, so that we do not stop from the time the process starts until it is finished, except when we have to detach our laterals and bring the main in and attach them again.

Mr. Sample: Why do you divide the tank?

Mr. Brown: While one end is being sprayed out, the other is being filled, and we have to turn a valve on the other side of the tank which shuts off one side and opens the other, so there is no stop at all.

Mr. Hume: For one reason or another, into which reasons I need not enter, there is quite a little interest in the changing over of trees, grapefruit and oranges, or oranges and grapefruit, from one variety to another. Mr. Cornell is going to tell us about some very satisfactory work that was carried out under his supervision.

TOP WORKING YOUNG GROVES

H. E. Cornell, Winter Haven

Mr. President, Ladies and Gentlemen:

Something has been written in regard to top working old groves to different varieties, but little if anything about this procedure with young groves.

This paper is an account of some top working done on a five-year-old grove which was very successful, and from which some information may be gathered that will be of benefit to any one who may desire to work over young trees.

In the spring of 1915, a certain section of grove comprising two hundred and seventy-five trees was set aside to be con-

verted into a test orchard. Practically all of the trees in this block were grapefruit trees on rough lemon stock. They were five years old, and in a very thrifty growing condition, the bark showing a light yellowish green color. The trees were from four to six inches in diameter, with a spread of branches of from ten to twelve feet, and branched at an average height of two and one-half feet from the ground.

The top working was done the last week in March. Before that time the grove had received its spring application of fertilizer, but after top working was done no more fertilizer was applied. Just the grove rows were harrowed throughout the growing season, and a cover crop of beggarweed allowed to grow in the middles.

It was planned to top work this grove to two trees each of seventy-five varieties of oranges, grapefruit, lemons, limes, tangelos and kumquats, and fifteen trees each of six standard varieties of orange trees.

These trees were not cut back at all before budding as is the usual custom with old trees, for the bark was very open and slipped well on the original branches.

First each tree was labeled, bearing the name of the variety it was to be budded to.

Then a pruner went through the grove and cut out a few limbs from each tree to enable the budder to handily get in near the trunk where the main branches joined the trunk. None of the limbs that were to be budded were cut.

All bud wood of the different varieties for the entire grove was secured, and an expert budder set to work inserting buds. Buds were inserted in the main branches, two to each branch and low down in the tree; about four inches from where the branch joined the trunk. Wherever possible extra large buds were used as the branches averaged an inch to an inch and a half in diameter. The buds were wrapped firmly with waxed cloth and the entire bud covered.

After the buds were inserted, all branches which were not worked were cut out, making permanent cuts which were painted.

After fifteen days the wraps were taken off, and at least ninety-five per cent of the buds had taken; enough to insure a good head on nearly every tree. Then on branches in which live buds were, all lateral branches and twigs were cut out and just a small twig left on the end of the branch. This was to serve as a sap lifter in order to keep the sap flowing and to not allow all of the growth to rush out through the freshly budded eyes.

These buds were at no time staked for support. After they had grown out from eight to twelve inches the ends were pinched off. This checked the bud temporarily and made it grow sturdier and stockier. The buds of course then branched, generally two branches, which were allowed to grow another ten or fifteen inches and then pinched back again. After the buds had made their second growth, and were pinched back, the sap lifter mentioned above was cut off to within six or eight inches of the bud. This was done in order to now allow all of the growth to grow into the buds. These could have been cut off with a permanent cut close to the bud and painted, but this

would have entailed unnecessary work as some of the buds would not be left on in the fall. All of the buds were allowed to grow to insure a good head as some of them would become injured with the wind or other agencies during the season. During the growing season they were pinched back from four to five times, branching each time and forming a fine large head. They were then from six to eight feet long, and after that were allowed to grow without further pinching back.

In December the buds were thinned out leaving five or six which were best suited in every way to form a head. The six or eight-inch stubs which had been left were cut off, the cuts being made smooth and slanting and then painted. All other stubs were treated the same way, leaving nothing but the trunk and the new tree. In making these cuts the angle should not be too steep. If it is, the union is too thin and weak and the branches might be torn off by the wind.

All buds were painted with a red band an inch or so above the union. This is done in order to prevent trees from reverting to the original. After the buds had fully grown over, it would be very hard to distinguish one of them from a sprout, which might come out from below the union. This would be especially true if the new variety of grapefruit was budded, as some were, on a grapefruit tree.

Every tree was staked showing on the stake the name of the variety and the number, with a corresponding plat on file at the office.

In this work some results attained with the different varieties may be of interest.

All of the grapefruit, round oranges, oranges of the Mandarin type and tangelos were very successful.

The different varieties of limes were also successful. The Key Lime made very fine tops, but showed a slight tendency to die back. The Rangpur Lime did very well, but on account of its straggly somewhat horizontal growth, its branches were not effectually shaded and some of them became a little sun blistered.

Four varieties of lemons were entirely satisfactory. The Ponderosa lemon started well, but on account of its heavy floppy growth the branches leaned over from their upright position, and became so badly sun blistered that they will die.

Four varieties of kumquats were put in eight trees, but all were total failures. Like the others these buds were inserted in the main branches near the trunk of the tree, which seems to have been a mistake. The flow of sap there was too great for such small eye buds and none of them lived. They should have been budded higher up in the smaller branches.

Two trees were budded to citron, and although repeatedly re-budded failed entirely. Possibly same procedure of budding as with kumquats, in smaller branches would be more successful.

No re-budding was done on any of the other trees except tangerines. These are a little difficult to make live, and as fifteen trees were worked to this variety, some of the trees had to be re-budded in order to get full heads, but are now solid.

Taken as a whole the result from this work was very satisfactory.

During the growing season the buds grew from six to eight feet in length and

made a diameter of from one and a half to two inches, with beautiful branches making well shaped heads. Having such a large root system to draw upon, their growth was of course very thrifty, and the leaves exceptionally large in size, and a very deep green color. Absolutely no frenching.

This spring the trees put out a very good growth. They were given an application of two pounds of growing formula and will perhaps be given from six to eight pounds more the balance of this year to keep them in a thrifty growing condition. By next season they will have enough head to take care of as much fertilizer as the rest of the grove. In fact in another year it will be hard to distinguish the difference in size between the top worked trees, and those in the grove which were not worked. They will be almost as large.

Some of the trees set a few fruits this spring and many of them will probably bear next year.

Photographs of these trees before rebudding and one year after budding, are on exhibition.

Discussion

Mr. Stevens: I would like to ask if any painting was done to keep the trunk from being sunburned after the top was cut out?

Mr. Cornell: Not any. There was no sunburn on any of the trunks.

Mr. Stevens: I would like to ask how high from the ground the lowest bud was put in?

Mr. Cornell: About three or four inches from where the branches join the trunk.

Mr. Skinner: I re-budded a grove of about five hundred trees last year very successfully. I re-budded another grove very unsuccessfully. By the way, the work was done in the summer. I give this experience so that other people may profit by it.

Where the work was done successfully, the budder in that grove allowed the growth that would come out, to take care of itself. After that growth had become perhaps ten or twelve inches long, he cut back the growth from the tree itself to about four inches of the stem, leaving the buds intact, but leaving the other twigs to take care of the excessive sun. Those trees have done wonderfully well.

The other budder did not understand his directions but tried to force all the sap into those buds and killed most of them.

Mr. Dade: My method is to begin at the top and leave the sides to protect the trunk and prevent the sunburn. I never had any trouble with their dying back. I would not cut anything away; at least I have put as many as thirty-five or forty in a single tree and then I would take out the top of the tree and leave the side branches to protect the trunk. In two years after I commenced that, I was getting fruit from the tree. I got a full top almost at the beginning; they were large trees.

Mr. Hart: It seems to me that it would be better oftentimes to go as far as you can, and lap the top and limbs instead of cutting them away. In that way you keep the rootlets active and have the benefits

of the limbs left on the tree instead of having them cut away.

After the big freeze of 1894-95 and 1897, a great many of the growers of the State were utterly ruined by trying to force the strength of a whole big root system to one or two or three buds. They let the sour sprouts grow up and budded into those and then cut them off. Then they would have to force out a strong growth and get leaves as soon as they could. As soon as it got breathing surface enough to supply what was left of the roots I think a large portion of the root sytsem was gone beyond recovery.

I think there was no one in the State who got their grove into bearing condition as quickly as Mr. Dudley Adams and myself, and we followed the lopping system altogether. Leave your foliage below the bud as far as you can and the natural flow of the sap is to the high bud. If it is a sweet bud it is going to go ahead rapidly and have the benefit of the original stock to help it, and after a year or two you can gradually take that away, and you have a big top and the tree feels no shock. If it is a bearing tree, the limbs that are lopped will bear more than if you do not lop them. It seems to force out the fruit buds and you get a good crop while you are making a full top.

I have followed that system, and I have found it very successful.

One thing you have to fight Mr. Skinner referred to; that is sunburn. If you have large trees you are lopping, the trunk should be shaded in some way from the rays of the sun, otherwise you will not get as much of a crop from the limbs as you otherwise would.

Another thing; there is a little more danger if the year after the trees are lopped there comes a severe cold, but I do not think the danger is as great with the lopped limbs or top as it would be if you cut away everything and had the new buds only to depend on.

Mr. Hume: I think Mr. Hart is quite right. The lopping of the limbs on the older trees is almost a necessity. In the younger trees I do not believe it is necessary. I think about the only trees that are likely to be sunburned are those trees that are hide-bound.

Eliminating the Drone Trees

Prof. Leo B. Scott
U. S. Department of Agriculture

A few years ago a pomologist was supposed to be a man who at a glance could classify at least thirty or forty varieties of any one kind of fruit. In the agricultural colleges a large part of the student's time was consumed in mastering the details of varietal classifications. A fruit grower who could not discuss the relative merits of a number of varieties was not considered up-to-date. This condition was not confined entirely to deciduous fruit sections. Here in Florida, and we are referring especially to Florida in the days preceding the "great freeze," there existed the greatest rivalry between the various localities. Each town, each community, was striving to produce an orange superior to that grown by the neighboring communities. The result was that many groves were in reality a miscellaneous collection of varieties—to be more exact—variety test plots.

The variety test plots have served their purpose. It seems necessary to pass through a certain stage in the development of any horticultural industry. The first impulse is to rush off to every section of the globe and import trees or plants which can be grown in the new section. You have passed through that stage in your development; you have gathered together a great number of varieties. Fifty or sixty varieties of oranges have been described which can be grown in Florida. This varietal collection is further augmented by a great number of seedling trees. What is the result? Florida oranges are known on the market simply as Florida oranges.

On the other hand, California has found that two varieties of oranges are suited to their conditions. The other varieties are raised in such small amounts that they can be considered practically as negligible quantities. What is the result there? The Northern and Eastern trade is able to recognize these two varieties. They know the Washington Navel because of its trade-mark, the navel characteristic, and they know the other orange must be a Valencia because it is *not* a Navel.

This is a day of specialization. In no place is it so clearly intensified as in subtropical fruit activities. In only a relatively small part of the United States can citrus fruits be grown, and enough fruits have to be raised in this small territory to supply the whole country. In 1911 the average Florida citrus production was less than a packed box per tree. Such a condition ought to arouse grave concern.

At the risk of repeating much that may seem like an old story to many of you we want to briefly review the work which the Office of Horticultural and Pomolog-

ical Investigations of the U. S. Department of Agriculture has been conducting in California and to bring to you a hurried summary of the results obtained there. You must bear in mind that in California the standard citrus varieties are practically limited to two orange varieties, two lemon varieties, and one grapefruit variety, so that at first glance it would appear from the variety standpoint that the industry was established on a firm basis.

This was the view that was formerly held by all pomologists and by all fruit growers, that with the establishment of a variety there was no further room for improvement.

About seven years ago Mr. A. D. Shamel, who had made an international reputation because of the work which he had done in selecting improved types of seed propagated plants, was sent to California. In visiting groves in all sections of the State he noticed marked differences in trees. Some trees were loaded with fruit, while adjoining trees were practically barren. He asked different ones to explain this condition, but received very unsatisfactory replies. Invariably a grove owner would state that the trees which bore no fruit that year had borne heavy crops the preceding one. When pressed for confirmation of this point they would reply that the simple fact that the tree showed no fruit this year was conclusive proof that the tree had borne a heavy crop the year before. Shamel was not so sure that was the explanation. Marked differences in quality of fruit were found, some fruits being smooth, thin-skinned, of fine quality and others coarse, thick-skinned and practically worthless.

Because of the great variation which aparently existed among citrus trees in California under the same cultural and other environmental conditions, it seemed advisable to conduct a detailed investigation to determine the amount of variation in standard citrus varieties and whether or not by careful bud selection those differences could be propagated.

The first investigations were commenced with Washington Navel oranges. Shortly afterwards performance record plots were located in the other standard varieties, Valencia oranges, Eureka lemons, Lisbon lemons and Marsh seedless grapefruit. Detailed records were secured of the number and weight of fruits in each size in the various grades from each individual tree for a series of years. So that any statements which have been made or will be made concerning the fruit improvement investigations are not based upon theory, but upon actual work with the trees and fruits themselves..

As a result of these investigations it has been found that a variety instead of representing one strain of fruit is in reality composed of a number of strains. What do we mean by the word strain? We have used that word, possibly some other would be better, in referring to any variation which occurs within a standard variety with considerable frequency in a number of different sections. Sometimes these differences in strains are confined to differences in production, others to differences in quality of fruit and still others to difference in habit of tree growth. The various strains occur as whole trees, as limb

sports and as individual fruit sports. In the Valencia variety in California twelve distinct strains have been found. A few of the common ones are the annual yearly bearing strain, an alternate bearing strain, a round smooth strain, a deeply ridged or corrugated strain and a wrinkled strain. In the preliminary surveys which have been made in Florida groves, many of these same strains have been found. A variety is made up of a number of strains, some worthy of propagation, others not.

Some groves have been found in which as high as ninety per cent of the trees were unproductive trees. Think what that means. It costs just as much to take care of a poor type tree as it does a good type tree. How much better it would be if all the trees in a grove were bearing not a maximum crop, but even a good average crop.

In addition to the difference in strains there is often a great individual difference in production within each strain. One tree will be found with six boxes of fruit, the one next to it will have only three boxes of fruit of equally good quality. These differences in production will be consistent from year to year. No matter how much care and attention you give the three-box tree, you can never bring it up to the standard of the six-box tree. One is inherently a heavy producer, the other is not.

The work has progressed far enough to show conclusively that these differences can be propagated by means of careful bud-selection.

In selecting bud-wood for rebudding unproductive trees not only are good standard record trees picked out to be used as sources of budwood, but no budwood should be cut unless the fruits are attached to the bud stick. By using this method of cutting budwood, we believe the fruits on the end of the bud stick can be taken as a guide or an indication as to what we can expect the buds on that stick to produce.

In one ranch in California 3,000 unproductive Eureka lemon trees were successfully worked over to productive trees simply by using this method of cutting budwood from fruit bearing wood on productive trees and in three years' time the young rebudded trees were bearing more fruit and better quality fruit than they formerly bore as large unproductive trees. Think what that means! In three years' time worthless unproductive trees were successfully worked over to valuable productive ones. We could cite hundreds of other instances where similar results have been secured.

The result has been that citrus growers in California are awakening to a realization of what their actual tree yields are and what they ought to be. There is a growing demand on the part of the citrus growers for information as to the best ways of finding out what their individual trees are doing. On thousands of acres in California definite records are being secured of individual tree production. One firm is securing such records on 1,500 acres.

Florida growers, you have an even greater problem to face than California. First, you have to decide what varieties are going to be your standard ones, then you will have to find the ideal strains within these varieties and concentrate on the

propagation of these strains. Are you going to be content to have your fruit simply known as Florida oranges and Florida grapefruit? You have varieties of superior quality in Florida. Why not concentrate on their propagation and development? We are not going to attempt to choose these varieties. The growers in the various localities will have to settle these points themselves. In many sections two varieties of orange, such as Pineapple and Valencia could be developed as standard varieties. These varieties have distinct characteristics which could be easily recognized by consumers.

Are you going to be satisfied with an average production of less than a box per tree made up of a miscellaneous lot of varieties when you can just as well have a production of three or four boxes per tree of standard varieties. How are you going to find your good strain trees? The only accurate way is by using performance records.

By the term "performance record" is meant the securing of an accurate record of the amount and quality of fruit borne by each individual tree in a grove from year to year.

Three important factors are involved in the securing of accurate individual tree performance records. These are, first, a definite system of individual tree numbering; second, a definite system of individual tree picking; and third, the recording of the individual tree records in permanent record forms.

In order to effectively secure commercial individual tree performance records it is absolutely necessary that the system of tree numbering which is used be a very simple and permanent one. A plan which has proved very practical under California conditions is to divide the orchard into a number of blocks. Each individual tree is given its own tree number and this number is painted on the tree trunk with white lead paint. This tree number consists of the block number, row number, and the number of the tree in the row, thus: Tree 4-8-16.

4

8

16

instantly locates that tree as being in block 4, row 8, and the 16th tree from the end of the row, always numbering from some given point. Where such a system of tree numbering has been practiced it has been found that in a very short time unskilled laborers can be trained to perform this operation with the result that the cost incidental to the numbering of citrus trees varies 40 to 50 cents per acre.

The advantages of such a system of tree numbering are at once apparent. No matter how large an acreage, there never will be a duplicate tree number.

In addition to the value which the individual tree number will have in the securing of performance records, it also serves as a means of identification for the individual tree in a number of other ways. For instance, if a tree is found badly affected with scale, the tree number can be jotted down in a notebook and that tree can be given instant attention. Tree numbering probably is one of the most essen-

tial points in the systematizing of grove and orchard operations.

If, because of weather conditions or the peculiar branching habit of trees, as is common in many old Florida groves, it may not be advisable to paint the tree number on the tree trunk, in this case the tree number could be stamped on an aluminum label, the label attached to a long copper wire, the wire attached to a copper nail and this nail driven into one of the main branches or tree trunk. Some modification of these two methods of tree numbering will be applicable to citrus conditions in any grove.

A second important factor in the securing of individual tree records is that each tree be picked separately. In large citrus groves it will be necessary to have one man for each row. He should be assigned to the first tree in that row, pick all the fruit from that tree and assemble it in boxes at the base of the tree before proceeding to the second one. In large picking crews it will prove expedient in order to conserve the picker's time, to have one man whose sole duty is placing of the empty boxes under the individual trees. After the performance records are secured, this man will carry the full boxes to the wagon and help load the wagon.

In large picking crews one man will have to be detailed whose sole activity will be the recording of individual performance record data. In smaller crews the picking foreman probably can secure this information himself. This man should be provided with suitable field note books for securing these records. Before recording the amount of fruit borne by any tree he should see that the boxes are properly filled and should not record a full box unless the box is filled with fruit level with the top.

On the following page is shown an actual citrus tree record which can be used in securing records of individual orange and grapefruit trees' production. Space is provided in the heading of the blank for recording the year, block number, row number, variety, name of grove and location of grove.

As in many sections at least two picks are made of oranges and grapefruit each year. A place is left on the blank for recording the amount and quality of fruit obtained at each pick. Space is provided for the recording of the data from 40 trees on each page. Probably never more than 40 trees will be found in any given row. In the first column the number of full boxes borne by the tree is recorded. In the second column is a place for recording the fractional box remaining, if there is any, from each tree. For all practical purposes this can be expressed either as 1-4, 1-3, 1-2 or a similar fractional term. While it will not be practical to grade the fruit closely in the field, it will be possible by a very hasty examination to determine, in a general way, the quality of fruit borne by each tree. In the column marked "grade" the quality of each individual tree can be designated by the letters A, B, C or D. If the tree produces a noticeable number of sports, freaks, or off type fruits, this fact can be noted in the column headed "Notes."

If care is used in the field in recording the individual tree records there will be no need of transferring these records to any other form. At the end of the pick-

Year_____

Block No.____

Row No.____

ANNUAL CITRUS TREE RECORDS

PICKING DATES

Variety_____

Grove_____

Location_____

Tree No.	FIRST PICK			SECOND PICK			Total	Notes
	Boxes	Part Boxes	Grade	Boxes	Part Boxes	Grade		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
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ing season, the individual tree records can be detached from the book and placed in suitable filing cases so that the records of each tree can be filed in one place.

The chief objection raised by growers who are not securing individual tree performance records is the excessive cost which would result in the introduction of such an operation in their groves. On the contrary, it has been found where systems of securing commercial individual tree records have been introduced in citrus groves that these records can be secured at practically little or no expense. As previously indicated, in discussing picking operations, it is necessary to re-organize in many cases the established plan of operations. In California citrus groves, for instance, the old method of picking fruit was to have a box row. In this box row, the empty boxes were placed and here the wagons were loaded after the boxes had been filled. Four rows were picked each side of the box row. It was necessary after a picker had filled his sack with fruit to walk from the tree over to the box row and empty that sack of fruit. Under the new system of picking, a box row is still used. One man, as previously indicated, scatters the empty boxes under the tree, the picker assembles his fruit in boxes under each individual tree. A second man or "secretary" secures the performance records of each individual tree's production and he, with the first man, carries the boxes over to the box row and loads the wagons. The pickers, however, as soon as they finish one tree, go right to the next one in that row, and it has been found in large picking crews that they actually pick enough more fruit in a day when using this new system to more than pay for the two extra men's time; so the actual securing of the records is accomplished with practically little or no additional expense. The heaviest item of expense in securing tree records is the initial one of numbering the trees.

After a series of years' record the grower will be able to determine which of his trees are worthy of being kept and which ought to be eliminated. By referring to the performance records he can also determine which of his trees should be used as sources of budwood. The information which he obtains will in many cases prove surprising. Many growers who have thought their groves were high producing ones have found after securing performance records that as small a number as ten per cent of their trees were bringing in the returns. The rest of the trees were "boarders" or "drones."

In a further attempt to limit standard varieties of citrus fruits no new varieties should be introduced unless they have some inner characteristic which is superior to any of the standard varieties and unless they have some outer "trademark" or characteristic which is instantly associated with that particular variety. We, therefore, are trying to discourage the introducing of new varieties unless the varieties in question have the qualities before referred to in such a high degree as to make them stand out as clear-cut superior varieties. The problem then confronting the Florida fruit growers is not a search for new varieties but a weeding out and elimination of many which you already have. Fortunately your leading nurseries are recognizing this point and are limit-

ing the number of varieties offered each year.

You will have to go further than the elimination of varieties—you will want to get the ideal strain within the variety. You will not be content with an average citrus production of one box per tree, but will want three, four or more boxes per tree. Dairymen have long ago recognized this principle and apply the Babcock test to their herds to weed out the drones. Poultrymen resort to the trap-nest to eliminate the boarders. Progressive corn growers practice seed corn selection to secure higher production. What are the fruit growers doing? They are just awakening to a realization of the fact that their trees have got to be considered on the individual rather than the acre basis. A citrus tree certainly is of as much value to the grower as a cow is to a dairyman. If a dairyman can afford to apply the Babcock test to his cows when he has 1, 2 or 3 to the acre, then should not the fruit grower apply the same test to his trees when he has 70, 80 or 100 to the acre?

These differences are not confined to any one locality, to any one class of fruit or to any one variety. It is a problem which confronts the apple grower in New York, the peach grower in Georgia, just the same as it confronts the pineapple, avocado and citrus growers of Florida.

The principle has been worked out in California. The experimental work does not have to be duplicated in Florida. It is a problem now for you growers to take up for yourselves.

It has been suggested in recent issues of the "Florida Grower" that this society go on record as favoring a suggestion that all citrus nurserymen be compelled to furnish nothing but performance record trees. Such a move would safeguard the grower but the nurserymen should be considered. It is not possible for large nursery interests to immediately change their entire plan of operation. Many of the nurseries would not be able to secure enough bearing trees to use as sources of budwood. The solution of the trouble lies with the grower.

If you growers would form a Citrus Tree Registry Association, and if each man in this room today would agree to keep records of 100 individual trees it would be a start towards the solution of the problem. You could let the nurserymen become members of the association with the privilege of buying buds from members who had record trees. When a tree owner furnished a nurseryman with a lot of budwood he would also give him a record of the amount and quality of fruit borne by that tree. Of course, the nurseryman, when he sold the young budded trees, would charge 30 or 40 cents per tree more than for ordinary nursery stock, but he would be justified in doing this. Why? Because he would then be furnishing a guarantee with each tree, which actually meant something.

The time is right for the forming of such a registry association. Florida growers are better organized as a result of the citrus canker fight than ever before. Such a registry association would rapidly grow into one of the powerful organizations of the State. It might be handled as an auxiliary organization of this body, it might be handled as a branch of the

Growers' and Shippers' League, or it might be an independent organization.

The essential thing to consider, however, is to perfect some form of organization which can be the official organ in standardizing your grove production and in increasing your individual tree yields. Make every one of your trees performance record trees, study your own trees, apply the Babcock test to your groves, increase your production and by selection and rebudding eliminate the drones.

Discussion

Mr. Hume: I am sorry to have to limit Prof. Scott's discussion, but I think he has told us more in twenty-five minutes than many another man might have told us in an hour. We can have five minutes or such a matter for discussion. There may be some question someone would like to ask.

Mr. Sample: If you paint your trees, what kind of paint would you suggest?

Mr. Scott: We found, under dry conditions, that pure white lead would show up well after five or six years, but in other work where the weather conditions were not so favorable, the numbers after two years had become rather dim. I do not know, for Florida weather, that the numbers would be very legible after probably three years, still it would not be a very excessive cost to go over and repaint those numbers.

Mr. Hume: I might suggest driving a stake near the tree and painting that with the number of the tree with the lead and turpentine.

Mr. Sample: The stakes are in the way of cultivation and might be torn down.

Mr. Scott: Couldn't you put the stake close to the tree, and use the large aluminum labels? You can purchase for a relatively small cost a machine which will number labels automatically. Then you can stamp the number on the label and drive it into the tree. You should not, of course, tie it around the tree.

Mr. Hollingsworth: I will give you one point that I have found works successfully. Simply take a sharp knife and cut those figures in the body of the tree, not to injure the tree in any way, but just the rough part of the bark. The figures will stay there indefinitely. They will remain as distinct as can be.

Mr. Hart: I have been keeping an individual record of my trees for over thirty years. I have it in book form. I took an old patent medicine book and have kept a record in it of my trees, but that did not include all of the record.

I have used paint on my trees for numbering. I had different varieties in my grove, as I had to have because of the difficulty of getting buds after the big freeze. Paint has been fairly satisfactory, because, although it will diminish to a large extent after a while, we can paint the numbers large enough so that we can see them at quite some distance.

I think a label attached to a nail in the tree would be good, if large enough to show the mark distinctly at a little distance. A wooden label with the number of the tree, number of the row and what

other marks you might want to use, painted on it and attached to a nail in the tree, would serve your purpose. I have not tried that. I know one grove in California where they use a wooden label, that is just nailed to the tree trunk and they have painted the number on the label.

If you attach the label to the limbs, always try to get them the same relative position on each tree, that is, approximately the same distance from the ground and each on the same side of the tree.

Mr. Dade. In some places they are using metal labels attached loosely around the limb, and keep a record of the boxes from each tree.

Mr. ———: Would the use of aluminum numbers as used for automobiles be satisfactory if used with copper or brass nails?

Mr. Scott: I should think the cost would be excessive.

Mr. ———: I should think that spraying would in time destroy the paint; we use spraying here so much more than they do in California.

Mr. Scott: I do not believe the paint will be affected very much, because I have seen instances where trees have been sprayed with Bordeaux mixture and the number was visible.

Insects and Diseases

Mr. Poole

By way of introduction, a point I wish to bring out is that I am not a pessimist in regard to our grapefruit situation. On the contrary, I feel very much encouraged and that, too, in spite of conditions that do not seem to be very encouraging at this time. We know there are problems in connection with shipping and marketing of this fruit; also problems concerning grove culture that will need to be worked out more thoroughly, but in the position I am placed at the present time, I wish to confine myself to the one phase; that is, the diseases to which grapefruit is especially liable.

Last year I had the privilege of presenting to you some spray figures in regard to the keeping of grapefruit clean, in which we demonstrated to you clearly the great value of a systematic spraying arrangement for the control of scab and different forms of rusting of the fruit. In those records we showed to you that by an expense of somewhere between 6 and 10 cents per box—let me call that expense an investment—there was a net return of between 20 and 30 cents per box for that fruit. It paid to do it.

I have figures with me this morning in which the difference between the first grade and unsprayed fruit is greater than it was last year; in the December pool of that packing house there was a difference in the first and second grade of 32 cents; between the second and third grade, 39 cents, and between the third, which is usually the last grade packed, and the fourth grade, which they call the "Duke" (the grade usually not packed at all when prices do not warrant it) there was a difference of $1.07 per box, making a difference in prices between the first grade and this last grade, of $1.78 per box.

A Table Showing the Differences in Prices Between Grades of Grapefruit for the Season of 1915-16, of the Winter Haven Citrus Growers' Packing-House.

Pool	Dif. Between Blue-Red	Between Red-Yellow	Between Yellow-Plain	Total
1—	$ .40	$ .72		$1.22
2—	.30	.42	$ .52	1.24
3—	.32	.39	1.07	1.78
4—	.19	.34	.95	1.48
5—	.19	.07	.23	.49
6—	.38	.14	.54	1.06
7—	.17	.15	.49	.80
8—	.28	.30	.65	1.23

The above are average figures for fruit shipped during the past season.

Growers are very apt to consider money received from cull fruit as money picked up in the road, and when you find the to-

tal amount of fruit going into that grade averages about 25 per cent of your crop, it is entirely a different proposition. The fruit going into that grade is largely caused by the presence of scab upon the peel. Systematic spraying will eliminate a large part of that problem. It has been demonstrated time and time again that such is the case.

We started this spring two different series of experiments for the purpose of controlling the scab. Starting in December we had all the scabby growth pruned off the trees, which had been planted about one year, and left alongside of those rows which were pruned, some rows unpruned. My idea was to see if the pruning would have any effect on the presence of scab as the new growth came out in the spring.

Then again we carried out a regular spraying program on the older bearing trees for the control of these diseases. Unfortunately, the weather has proved to be so dry that neither the sprayed portions nor the pruned portion have furnished very satisfactory results. We cannot, under these conditions, form a very definite conclusion from these experiments.

We do know from past experience, however, that the spraying is of great value.

Where we used the lime-sulphur during the month of January, we noticed an almost total absence of mites up to within about two weeks ago. When we began to find any, they were six-spotted mites. There were no red spiders, and up to the present time there has been no rust mite, apparently, upon these trees.

Trees sprayed with ammoniacal solution of copper carbonate, about the first of April began to show traces of various kinds of mites.

I wish to call attention to the fact that trees having leaves badly twisted by scab, furnish a harbor for scales. It is almost impossible to hit them with the spray.

I am glad the Nursery Inspection Department is going to rigidly inspect nursery stock and especially where stock has not been grown clean and healthy in the nursery. Those of us who are engaged in the business of taking care of young groves know how important it is to have strong, healthy stock. Anything that will hold up the standard of the stock is welcome to us.

SCALE, WHITEFLY

G. M. Wakelin

Last spring Prof. Spencer asked us to make a demonstration in spraying and so we left one row through a section of the grove entirely unsprayed. These trees were half pruned and half unpruned.

In the course of three months this row

looked so bad in comparison with the adjacent rows, being very black with the sooty mold, that we sprayed all but four trees left for the demonstration conditioned as follows:

No. 1, pruned and sprayed.
No. 2, pruned and not sprayed.
No. 3, not pruned but sprayed.
No. 4, neither pruned nor sprayed.

By November the pruned trees, sprayed and not sprayed, had, I thought, a "slight edge" on the unpruned ones, sprayed and not sprayed, respectiveiy. And as one would expect, the sprayed trees were much better than the unsprayed. These were badly damaged by the scale, which caused nearly all the fruit to drop, more than half the leaves, and killed a number of branches. The damage was much increased by the spray used at the end of the demonstration, as it had separated on standing and consequently burnt the foliage. This additional loss made an accurate comparison out of the question, but apparently we had demonstrated the efficacy of spraying. The trees sprayed had two applications of oil and soda sulphur in combination and one of lime sulphur.

But hold on a minute. Curiously enough the two sprayed trees had a tremendous amount of the pink scale fungus on them in October, particularly on No. 1—pruned and sprayed—while No. 3 and No. 4, unsprayed, had but little. It is possible that the fungus destroyed as much scale as the spray. Furthermore, some other trees at a distance, though sprayed, suffered severely from scale. Still others which had not been sprayed for years, showed little scale or fly and others still were black and scaly. I have seen the same conflicting results elsewhere. Apparently there is an element of chance. We know, of course, that trees unsprayed will not *necessarily* be infested with insects above a certain minimum to which their natural enemies will reduce them. Neither will spraying every time wipe out the pests. The rather poor results secured in spraying for scale here were due to the fact that we should have sprayed in September or early October, whereas we waited until November in order to get both fly and scale. Not much could have been done in October anyhow, as it was a very wet month. By the time the trees were sprayed the scale was old and had done considerable damage, as the fly kept on the wing very late last fall.

A fair inference from the above is that if scale is present in quantity the grower must spray for them at the right time to catch them young. If it is also the proper time to catch the fly in the early pupa state, well and good. If not, he will simply have to go over the grove a second time for the fly and by so doing he will be sure of getting both.

A second inference would seem to be that a poor job is worse than none. It often happens that trees which have not been sprayed at all fare better in a scale and fly infestation than those which have been sprayed repeatedly, but not well or at the wrong time to get the scale. This must mean that we have killed friends rather than enemies.

The whitefly is bad enough. It robs the leaves of sap and the sooty mold reduces their ability to function. But both of these injuries are inconsequential in

comparison to what the attendant scale will do to your grove if it gets a good start on you. It will cause the fruit and leaves to shed, kill even large limbs and make the little fruit left decay in transit from stem end rot.

Scale is said to follow the fly so badly because the sooty mold harbors it and the already weakened tree can not stand the additional drain. Doubtless true, but may there not be a third reason, namely, that mentioned above that in spraying for the fly we have not hit the scale at the right time but only made its ravages worse by killing friendly insects and perhaps fungi, too, if we have been using lime sulphur. On trees sprayed for fly I have seen the scale get bad before the fly did. A dry, hot August is very favorable for scale.

It is said that we should spray for every trouble and do it before damage is done, not waiting to see if nature will check it. But the spraying proposition is one to figure on. One can afford to take infinite pains with a good budded grove of standard varieties and a good bearer. However, we all know many groves of large seedlings where spraying must necessarily be both difficult and expensive. As spraying cost must be figured on a box basis, it is very necessary that every other factor contributing to good yields should be most favorable—plenty of moisture, fertilizer, intelligent pruning—or the cost per box may be excessive. In any event, the prospect is far from pleasing if we must spray continuously for all our troubles. It would figure up something like a total of ten sprayings per year: two or three each for scab and melanose, for scale and fly, for mites and spiders. Where does the grower "get off" at the usual price for oranges and grapefruit?

WITHER-TIP, ITS CAUSES, DIAGNOSIS AND REMEDIES

S. C. Warner

The causes which open the way to attacks of withertip seem largely to be the result of shock. In trees whose vitality has been reduced by drought, cold, overproduction with insufficient nourishment and attacks of insect pests are possible victims of the withertip fungi, which seem to be omnipresent and alert for just such opportunities. It follows, then, as an obvious conclusion that it behooves us to keep our citrus trees well watered, well sprayed, well nourished and comfortably warm, when possible.

While withertip is not difficult of diagnosis when one is familiar with its manifestations, it is rather easily passed over as only a case of drought, the leaf dropping being much alike in both instances, though in withertip not only do the old leaves shed, but also those growing on young but matured twigs, still leaving them green and of healthy appearance. It

is, perhaps, just at this stage of the disease when remedial measures can best be applied. If immediate action is taken by irrigating in cases of drought, the application of quick acting ammoniates and careful culture, I believe that usually the trees can be gotten back into healthy condition without much expense.

If the disease is permitted to progress the twigs, having shed their leaves, will die and wither, next the larger branches till, in aggravated cases, the tree presents a ragged and starved appearance. Pruning seems to be the only way to treat advanced cases of withertip with any certainty of satisfactory results. This should be done thoroughly, clearing out every diseased branch well back to healthy wood and to a point from which a healthy twig starts or, if necessary, to the trunk, making always a clean cut and leaving no knobs. A saw for the larger branches, then the chisel and shears.

It seems rather necessary to prune, either during the dormant winter period or in June and July. At other periods there is danger of re-infection.

In case of anthracnose, which is most apt to appear on grapefruit, resort may be had to ammoniacal solution of copper carbonate. This fungicide would, of course, have to be followed by a spray to check scale.

It is quite possible that where a grove is generally infested with withertip a loss of 20 or more per cent in crop may result. No doubt the aggregate loss to the citrus industry amounts to a sum in excess of our annual expenditure for the eradication of citrus canker—a disease infinitely worse.

The writer wishes to express his appreciation of the splendid work done by Prof. Rolfs in his exhaustive investigation of withertip and his treatise on the same subject, to which he wishes to call your attention and as well to Florida Experiment Station Bulletin No. 180, by Fawcett.

Mr. Hume: Prof. Newell has outlined the general work of the State Plant Commission. I think doubtless a good many of you would like to know what the canker situation is at the present time, first-hand, as you can get it now, and I am going to ask Prof. Newell to take five or ten minutes to tell you concerning the present status of the situation and what has been accomplished.

CITRUS CANKER SITUATION

Mr. Newell

This is a rather difficult subject to approach for the reason that the citrus canker problem has grown to be a very large one and the campaign waged against it is now being carried on on a very extensive scale. On the whole, I believe the situa-

tion is encouraging. I do not mean by this to say that the work of fighting this disease has ceased, for the longest and hardest part of the fight is probably still ahead of us.

Doubtless I can best give you an idea of the situation by quoting the exact figures on what has taken place up to the present time. There have been no infections found in new counties within the last few months. The last statement on the situation was issued by the Plant Board in December, 1915, and gave the number of infected counties as 21. That number has not changed since. These counties are Baker, Bay, Brevard, Broward, Dade, Duval, DeSoto, Escambia, Hillsboro, Jefferson, Lee, Marion, Pasco, Palm Beach, Pinellas, Santa Rosa, Seminole, St. Lucie, St. Johns, Suwanee and Walton. This list, of course, includes all counties where any infection whatever has ever been discovered and in several of these counties only one infected tree was ever found. The number of properties (by properties we mean the individual groves or nurseries) in which infection has been found is 380. Of these, 283 of the infected properties were in Dade county and the remaining 97 in other counties.

At this point I would like to make use of two expressions which are commonly used in connection with citrus canker; namely, "primary infection" and "secondary infection." A primary infection is one in an entirely new location. That is, it is the first case of the disease in a new locality. Incidentally, all the primary infections in Florida have originated by shipments of infected nursery stock to the points where these primary infections occurred. A secondary infection is an infection caused by local spread from a primary infection.

The total number of primary infections or foci in the State was 49.

In Dade county canker was introduced to one place which constituted the primary infection and all other canker infections in that county were secondary ones.

Up to the present time the total number of grove trees found infected with canker and destroyed is 11,546. The great bulk of these were trees which had not yet reached bearing age. In addition to these infected trees, 55,665 grove trees, which had been exposed to infection, were destroyed with the consent of the owners, making the total number of grove trees destroyed, both on account of infection and for precautionary reasons, 67,211.

In nurseries the number of infected trees discovered so far is 146,123. Nursery trees which were exposed to the infection and which were destroyed before the disease devloped on them amounted to 2,185,634, including seedlings and the trees in seed beds. This makes the total number of nursery trees destroyed on account of canker 2,331,757.

At first sight one might think that the destruction of two million nursery trees including seedlings, might result in a scarcity of citrus nursery stock that would advance the price of budded trees. Such a result is hardly likely, for according to the figures compiled in our Nursery Inspection Department from records and estimates made by the inspectors when they visited each nursery, there were, during the past season, approximately 40,000,000 citrus trees in the nurseries of

Florida and of this number 17,000,000 to 18,000,000 were budded. Putting it in another way, we have enough citrus trees in Florida to double the grove acreage without buying a single tree from outside the State.

Of the 380 properties in which canker has been found, 104 have been declared clean by the State Plant Board, and the quarantine restrictions imposed in connection with the infection have been removed. This does not mean absolutely that canker is eradicated from these premises, but it means that in the opinion of the Plant Board it is eradicated. A property is not declared clean until after several months of close surveillance and inspection without any citrus canker making its appearance.

Out of the 104 infected properties which the Plant Board declared clean, 3 subsequently showed infection. These 3 properties were in Dade county and were so located that we had no way of knowing whether the infection lay dormant in them for many months or whether they became re-infected from outside sources. The fact remains, however, that considerably more than one-fourth of the infected properties in the State have been declared clean by the Board and canker is thought to have been eradicated from them. There are 279 properties still under suspicion which are being inspected once a week and all citrus trees within a mile of them are being inspected monthly by skilled inspectors.

You can gain some idea as to progress that is actually being made in eradicating the disease, from the work in Dade county. I would like to give you the number of infected trees found in Dade county each month up to the present time, beginning with June, 1915. Up to June, 1915, the number of infected trees had been increasing each month, and in June 744 infected trees were found. At this time also, the force of inspectors was greatly increased in the attempt to catch up with the spread of the disease. From 744 infected trees in June, 1915, the number fell to 610 in July, 393 in August, 318 in September, 130 in October, 106 in November, and 68 in December. In January, 1916, the number of infected trees found was 45, in February 17, in March 25, and up to the 25th of the present month (April), 10. (Applause.)

These figures are not really a true index to the rate at which canker has decreased in Dade county, for the reason that the season has been very dry and conditions have not been such as to develop dormant canker to the point of being visible. However, we feel sure that we have located practically every tree on which any infection was visible at the close of last season. As a matter of fact, since the 16th day of March only one infected tree has been found in Dade county south of the Miami River.

The amount of canker being found in the State at the present time is not great. For the entire month of January throughout the entire State 86 infected trees were found, during February 22, during March 52, and up to the 25th of the present month (April) 49.

Most of you are familiar with the fact that exposed citrus trees were shipped all over the State of Florida from nurseries in Dade county and from another nursery

in the northern part of the State before the State Plant Board was created and before the nurseries were known to be infected with this deadly disease. These shipments were made during the season of 1913-14 and 1914-15, and most of them were from three nurseries only.

The Plant Board undertook last year to find all of these trees and get the consent of the owners to have them destroyed as a matter of precaution. Something more than 1 per cent of these trees have already developed citrus canker and from our knowledge of the length of time which canker may remain dormant, it is a certainty that at least one out of every one hundred of these trees will still develop the disease. From the nursery in the northern part of the State above referred to, 176,075 trees were shipped during these two seasons and up to the present time we have gotten rid of 41,828 of them with the owners' consent.

From Dade county infected nurseries, exposed trees to the extent of 139,739 were shipped and up to the present time we have succeeded in getting rid of 103,475 of them. These trees will carry a serious element of danger for at least two years to come and possibly for a longer period, during which time they must be frequently inspected. You can realize the magnitude of inspecting these thousands of trees when I tell you that they are planted, according to our records, in 53 counties of Florida, and there are only 51 counties in the State. (Laughter.)

The campaign against canker has been a very interesting one and it is still so. When the armies of Europe went to war they did not prepare for a short war of thirty or sixty days. They laid in supplies for a long campaign. To a certain extent this has been true of the campaign against citrus canker. Plans have been laid from the beginning for a long, hard seige, and, as is the case with all other wars, the greatest need was the need for ammunition.

The Florida Growers' and Shippers' League and the fruit growers themselves did their share, prior to the passage of the Plant Act, in contributing thousands of dollars in the fight against this disease. The Legislature of Florida did its share in April, 1915, when it appropriated $125,000 for eradicating citrus canker. The money has been well expended, but the disease was more wide-spread than was at first thought and the ammunition went pretty fast. In fact, it looked as though the State appropriation would all be gone by the present time, and had it not been for the ammunition which the Citrus Canker Committee got at Washington, canker would now be on the road to a rapid victory. The Citrus Canker Committee and what it did was the thing that saved the day. As usual, the Florida contingent led the fight at Washington, and I think I am safe in saying that Florida is leading the country in using the money. (Laughter.)

It is not necessary to remind you of the history of the campaign made by the Citrus Canker Committee at Washington this past winter. I saw a part of it and witnessed some of the difficulties and obstacles which had to be overcome by Chairman Gillett, and I want to say that I never had so much admiration for generalship and ability as I had for him dur-

ing that period. Many a time it looked as though the citrus canker appropriation was going to be defeated, only, by a shrewd movement, to be revived and again started on its way to a successful conclusion. We have a great deal to thank the members of the Citrus Canker Committee for. (Applause.)

We also have many others to thank—notably the growers of Florida in their magnificent support of the Citrus Canker Committee. The reresentatives from the citrus growing sections of the South and those from California stood side by side with the Florida men at Washington to get this appropriation to eradicate citrus canker from the United States.

INSECTS AND DISEASES FROM A NURSERY INSPECTOR'S VIEWPOINT

F. M. O'Byrne, Gainesville

Mr. President, Ladies and Gentlemen:

When it comes to the question of insect pests and diseases and their importance in groves and on nursery stock, there are probably almost as many view-points as there are orange growers in the State. They vary all the way from those who think that a nursery should be inspected for citrus canker only, to those who hold that no nursery stock should be certified unless absolutely free from all insect pests and diseases regardless. Many from both extremes and in between have written in and explained their ideas more or less strongly, so that my position is somewhat like that of the negro porter in a chair car, who was summoned by a rather fussy old lady and asked to put up the window. A lady across the aisle heard the instructions, and said with conviction, "Porter, if you put up that window I'll freeze." 'Well," replied the first lady with equal conviction, "if you don't raise that window I'll suffocate." The porter looked around helplessly, and noticing a traveling man, said, "Boss, tell me, what on earth I am to do." "That's easy", replied the traveling man. "Raise the window and freeze the one to death and then close it and smother the other one to death."

It is not the intention of the Nursery Inspection Department to handle their work in this fashion, but it has a policy that it believes to be a happy medium which will be pronounced sound by all of our more progressive growers. At the suggestion of the chairman of this committee I plan to tell you of our view-point concerning some of the more common insect pests and diseases.

PURPLE SCALE

Some consider purple scale unimportant and one nurseryman's association has filed written protest against including this insect among those declared by the Plant Board to be especially injurious. They

point out the fact that these insects are to be found in practically every grove in the State. But does this prove their point? Tuberculosis is generally distributed among humans, but we will all agree that it is especially injurious, will we not?

Perhaps we would have better perspective if it were not so generally distributed. E. O. Essig, the Californian entomologist, speaks of it as follows in the March Monthly Bulletin: "The purple scale is one of the serious pests of citrus trees and has been consistently fought by the fruit growers and horticultural officials since its first appearance in the State in 1888 or 1889. To this strenuous effort might be credited the comparatively limited distribution of the insect. While it has a wide range, there are as yet large areas of citrus orchards still clean and even entire counties have succeeded in keeping it out." I venture to say that many Florida growers who would like to wage war against citrus scab wish sincerely that they lived in a county which had succeeded in keeping purple scale from gaining entrance.

It is only since scab has become so injurious in the grapefruit groves that we have realized the full importance of the purple scale. I have seen grapefruit groves severely damaged by a heavy attack of purple scale following a single spraying with Bordeaux. But on the other hand, I have repeatedly sprayed a five-acre bearing grove six years old with 5-5-50 Bordeaux without the use of any insecticide at all and have not been bothered by scale, because the trees were practically free from purple scale before the spraying was started, and though there were a few scattering scale on some few trees in the grove, they were not able to multiply to injurious numbers before the rains had completely washed away all of the Bordeaux mixture, giving the friendly fungi a chance to become re-established. It is often desirable that young grapefruit trees, which are putting out their first flush of growth after they have been transplanted, be sprayed with Bordeaux in order that they may start clean and free from scab. This may be done with safety if the trees have left the nursery free from purple scale; but if they have a fair sprinkling of purple scale at the time they are planted, a spraying with Bordeaux would mean their almost certain death from the scale insect.

Some nurserymen have felt that their nurseries should not be quarantined on account of the presence of purple scale, although they recognize the fact that their trees were quite scaly. They pointed out, however, that they have a good stand of the friendly fungi which they have found to be a satisfactory control in their nurseries, and that these trees in being transplanted would carry the fungi with them so that the grower purchasing their trees would have nothing to fear on account of the scale.

The Nursery Inspection Department, however, does not recognize the friendly fungi as a sufficient and satisfactory control for scale insects in a nursery, though we do recognize their worth in a bearing grove and know that under many conditions they can be depended upon to keep the scale under control at most times. We do not feel that they are a satisfactory control in a nursery for the following rea-

sons: First, they depend for their effectiveness upon warm, moist weather. Therefore, in a nursery which depends on fungi for scale control we may always look for a severe attack of scale during a hot, dry spell. Second, with nursery trees standing close together in a row, the rows being only four feet apart and the trees in full leaf, the ground is shaded and the conditions are usually moist and favorable for the growth of the friendly fungi. But suppose that these same trees are dug, completely defoliated and set out in grove form in a waste of dry, clean, cultivated sand 25 or 30 feet from the nearest tree, with the sun beating down strongly every day, the conditions are the reverse from those found in the nursery. The tree is now standing in an extremely hot and dry locality and as a result the friendly fungi fail completely, the purple scale multiply and the little tree often succumbs to the double shock of being transplanted and having a severe infestation of scale at the same time. If it does not actually die, it is very apt to be severely stunted by the long fight for its existence.

The writer has had some experience endeavoring to control the scale on young trees which have just been transplanted from the nursery, and knows that at that time the fight is an extremely hard one and that many of the young trees are almost certain to be lost. Miscible oil sprays applied quite strongly at this time are very apt to burn and kill back the young growth on the newly set trees.

The time to spray nursery trees with a miscible oil or other insecticide is while they are still standing in the nursery on their own roots in a favorable environment. An insecticide applied at that time will be far more effective and much less injurious than if applied after the trees have been transplanted and are coming out with a nice young flush of growth.

WHITEFLY

What has been said concerning purple scale applies quite largely to whitefly. We do not recognize the whitefly fungi as a satisfactory control for this insect on nursery stock, for it fails completely in dry weather, and we all know that whitefly in large quantities on nursery stock is devitalizing. We feel that a man growing nursery stock should spray it regularly with an insecticide which will serve the double purpose of controlling both whitefly and scale, and as nursery stock is an intensive crop in which large value is concentrated in small space, we feel that this is no great hardship. Our position, then, is that the nurseryman should adopt the policy of growing his stock clean rather than growing it in any manner and attempting to clean it up at the last moment by a number of sprayings with strong insecticides.

CALIFORNIA RED SCALE

California Red Scale is one with which very few of us are familiar. So far it is only known to exist in two or three sections of the State and has only been found in three different nurseries. These nurseries have been promptly quarantined. Our reason for this action is that up to the present time this scale is not generally distributed through the State and we feel

that the Florida grower already has a sufficient number of insect pests to fight without adding a new one to his burdens. We believe that California red scale is as widely distributed through this State now as the growers wish it to be.

COTTONY CUSHION SCALE

Cottony Cushion Scale is an introduced insect, which was brought into the Pinellas peninsula on nursery stock from California. Since then it has been distributed on nursery stock, until now it occurs in many portions of the State, though there are large areas which are still completely free. Its ravages may be controlled by the Australian Lady Beetle or Vedalia, a predacious insect which has proven highly efficient. The Vedalia, however, is far more active than the cottony cushion scale and as a result, when infested nursery stock was prepared for shipment, the Vedalia usually left the stock and the cottony cushion scale alone was shipped. If the stock was sent to uninfested territory, the cottony cushion scale would multiply rapidly and do a considerable amount of damage before Vedalia could be secured and sent to that locality. Vedalia are difficult to secure, and to get them is expensive, and growers in uninfested localities demand protection. They would far rather secure nursery stock absolutely free from cottony cushion scale than to secure both the scale and the Vedalia to hold it in check.

A thorough scrubbing in a strong solution of whale oil soap will obviate any chance of nursery stock so treated carrying cottony cushion scale. Many nursery concerns located in cottony cushion scale territory urge that they personally be allowed to superintend the work of scrubbing this stock in preparing it for shipment. They point out that it would be a very bad business policy for them to permit the shipment of stock infested with scale, as it would injure the reputation of their nursery. This sounds quite plausible, but we found by practical experience that under these circumstances some nurserymen turn over the actual supervision of this scrubbing work to a trusted employee, who proves to be less trustworthy than has been supposed, with the result that some poorly scrubbed trees are allowed to leave the nursery and a new outbreak of cottony cushion scale results. Therefore, we are requiring that stock from a nursery located in cottony cushion scale territory shall be scrubbed under the personal supervision of an inspector appointed and paid by the State Plant Board, at the expense of the nursery concern.

Some nurserymen located in areas where cottony cushion scale is known to be generally prevalent have asked permission to do a local business without being put to the expense of employing such an inspector. At first glance it would appear to be quite a simple matter to arrange such a scheme, but in reality this is not the case. Our experience in granting special concessions to nurserymen doing a local business has been unsatisfactory. Some nurserymen have secured automobile trucks and have insisted on moving trees to distances far beyond the limits to which they were supposed to restrict their operations. Also there is almost certain

to be some man living on the edge of such an infested territory, and if his shipments were restricted to a number of miles in all directions he would be privileged to ship just that far into clean territory.

Any scheme that could be proposed to handle this situation would require a general survey of the entire State to determine exactly what areas were cottony cushion scale territory and what areas wouldn't be so designated, and it is not within the province of this Department to make such a survey. After mature consideration it seems that the only satisfactory solution of this problem is the one given, namely, that all trees from infested areas shall be scrubbed under the direct supervision of an inspector.

CITRUS SCAB

Citrus Scab is an introduced disease and was quite probably introduced on nursery stock. There is no doubt that scab has been quite generally distributed throughout the State on scab-infected nursery stock, and while some may be skeptical, it is nevertheless true that there are areas in the State where scab on grapefruit is not as yet generally distributed. Moreover, if a man should go into an isolated region and plant nursery trees he should not be compelled to fight scab from the very first, and if the trees that he plants are free from scab he will not have to do so. But if the trees which he plants were infected with scab in the nursery, one may be sure that the very first flush of growth which they put out will be infected. We hold that by carefully spraying seedling stock with a good fungicide at the proper time the amount of scab will be tremendously reduced and that the stock itself will make a sufficiently increased amount of growth to pay the nurseryman well for the cost of spraying, and that by controlling scab on the stock and fighting it on the buds with fungicides we feel confident that grapefruit buds may be grown practically, if not entirely, free from scab infection.

It is the intention of this department to quarantine each and every nursery in which buds are found to be severely infected with scab, and it is our ambition to reach the time when any nursery block showing scab on the buds may be refused certification on that ground alone. If there is one point upon which I believe we have the support of the growers, it is on the position we have taken concerning citrus scab.

It has already been necessary to quarantine a number of nurseries in the State on account of severe infections of scab. In some cases the nurserymen reported that on examination they found that their stock was more severely infected than they had thought and they have taken active steps to reduce the amount of scab present and to spray thoroughly at once, though in some cases they have not given their whole-hearted co-operation. It has happened that some of these quarantines have been placed during the shipping season and at least two of the nurseries have complained because a quarantine was placed upon them at that time, stating they would not have objected had I waited until the end of the shipping season to place the quarantine upon their stock, but coming at that time the quarantine did them

a large amount of damage. I hardly believe those nurseries realized what they were saying. Imagine my waiting until the end of the shipping season before placing a quarantine on their stock. I do not suppose that there are many nurserymen in the State who would object to a quarantine if placed in that manner. According to my conception, the time to place the quarantine is immediately upon receipt of the information that nursery stock is in unsatisfactory condition.

SCALY BARK OR NAIL-HEAD RUST

In the first place, I feel that it will be necessary for me to define this term, for it is a word which has been quite generally abused. By Scaly Bark I mean the disease caused by the fungus known as a *Cladosporium herbarum var. citricolum.* This disease starts as a small circular green spot on young growth. This marking develops into a brown spot anywhere from the size of the blunt end of a pencil up to one inch in diameter. In large matured specimens you are able to trace this marking even to a much larger size. On the older limbs it causes a scaling up of the bark, hence the name "scaly bark." It also causes a brown rust on the fruit about the size of a nail head, hence the descriptive name, "nail-head rust," for these characteristic appearances of this disease on the fruit. Please note that I do not refer to the shaggy bark type of gummosis which is often called "Shaggy Bark," but should more properly be called *Psorosis.* Some ill-advised persons have called this stage of gummosis "scaly bark" and have succeeded in getting many growers terribly confused concerning the distinction between "scaly bark" and psorosis, if they have not actually succeeded in becoming badly confused in the matter themselves.

Scaly bark is at present generally distributed in several sections of the State, one large area being located on the East Coast and the other area of about equal size being located on the West Coast with small areas at five or six other places. Most of the State, however, is free from this trouble.

We admit that in a great many groves scaly bark does not cause any great amount of damage, and that in certain sections it apparently does not spread rapidly. In other localities or in other groves in the same locality where it finds conditions more congenial it does a tremendous amount of damage. We know of groves in the State where fully 50 per cent of the trees are very severely damaged by this trouble and where a number of them have been actually killed by it, and this, moreover, in groves receiving more than ordinary care and attention. Some nurserymen located in scaly bark territory have made the claim that scaly bark exists in practically every old grove in the State. This statement is erroneous, unfounded and cannot be proven. Some have claimed that it only attacks trees in neglected condition. This also is a mistake, as has just been noted. Some hold that it only attacks old sweet seedling trees. Again, this is erroneous, for occasionally scaly bark has been found attacking grapefruit, and the writer has himself taken samples of scaly bark in a nursery which was severely infected with

this disease and has seen both Pineapple and Valencia buds not more than four feet in height severely diseased. It is interesting to note that the scaly bark was introduced into this nursery on budwood cut from a grove in which the scaly bark was doing practically no damage, and the owner of the nursery being very radical on the subject of securing clean budwood, cut only the best and cleanest that could be found. We see, therefore, that scaly bark may attack very young trees and also budded trees severely and that it is transferable on stock apparently free from the disease, and when introduced into a more congenial locality it will develop and cause a large amount of damage.

A man owning a nice bearing grove in a territory in which scaly bark does not exist has no way of knowing whether the disease would be mildly injurious if introduced into his grove or whether it would prove especially severe and damaging in his particular case. If he has good judgment he will not care to gain this information by planting trees which have been exposed to scaly bark; and even if he is not blest with good judgment and is anxious to experiment to see whether or not this disease would prove severe in his grove, his neighbor owning a grove, or merely the land upon which he hopes some day to plant a grove, is entitled to protection. Therefore, the sale of trees grown in territories where scaly bark is known to be generally distributed is restricted to the extent that no trees from such territory can be legally sold in other areas of the State. But nurserymen located in scaly bark territory are permitted to purchase a special certificate tag allowing them to sell their trees to others located in that same territory or in some other territory in the State where scaly bark is known to exist, but prohibiting the sale of these trees to clean areas.

The foregoing account explains some of the stands taken by the Nursery Inspection Department to protect the growers. The movement of uninspected nursery stock is a menace to the community and the entire State, while stock moving under certificate tags of the Nursery Inspection Department is as safe as good rules and careful inspection can make it. Of course we are not perfect and will always welcome suggestions for improvement. But it will certainly be to the advantage of every one to see that the stock which he buys and which his neighbors buy is properly certified.

Discussion

Mr. Yothers: I have prepared two charts, one for oranges and one for grapefruit. These represent about 90 per cent of the fruit sold in New York City at auction during the months of November and December. I did not have any way to find the prices or grades of fruit except through the reports of the auction, and these figures are taken from the New York Fruit Reporter. There were 25,470 boxes of first grade oranges, which is 16.9 per cent of the total number of oranges. These sold on an average of $2.48 1-10 per box. There were 76,592 second grade oranges, or 50.9 per cent of the total. These sold for $2.14 3-10 per

box, which is 30 cents less than the first grade fruit. There were 48,178 third grade boxes, which is 32.6 per cent. These sold for $2.10 1-5 per box, or about 18 cents less than the second grade fruit, and about 47 cents less than the first grade fruit.

The grapefruit shows up in much better shape; there were 10,812 boxes of first grade fruit, or 28.5 per cent. These sold for $3.26 8-10 per box. There were 18,425 boxes of second grade fruit, or 48.5 per cent, which sold for $2.66 per box, a difference of about 60 cents. There were 8,689 boxes of third grade fruit, or 22.9 per cent. These sold for $2.27 6-10 per box, or 99 cents a box less than the first grade fruit, and about 39 cents less than the second grade fruit.

A point I would like to make here is that I have shown several times before that it is possible, just by controlling the insects along in the citrus grove, to raise percentage of first grade fruit to about 40 per cent, the second grade about 50 per cent and the third to be reduced to about 10 per cent. I know of some records where the fruit graded 90 per cent "blue," that is, this fruit was handled by the Citrus Growers' Association and they grade their fruit blue, red and yellow, and there was 90 per cent blue. This surprised me very much because I did not know fruit would grow to that state of perfection.

To accomplish this desired end, it will cost from 5 to 8 cents per box. This would make the money invested in spraying a most profitable investment.

This is only a part of the work I am trying to do with statistics of citrus fruits. I am now working out the tables for January and February and March, for New York, Pittsburg, St. Louis, Boston and Philadelphia and these will appear in due time.

The Port and Railway Inspection Work of the State Plant Board of Florida

Wilmon Newell, Plant Commissioner, Gainesville

Among the many activities of this Society in advancing the horticultural industries of Florida, none stands out more prominently than those which resulted in the passage of the Florida Plant Act of 1915. While the work of the Society has since its beginning, been largely constructive in nature, the passage of the Plant Act was a step distinctly in the nature of conservation.

Because of the part taken by your members in getting the State Plant Board established and its work inaugurated, this may be a suitable occasion upon which to mention some phases of its work. Though as an institution the Plant Board organization is still in its infancy, it has already shown itself to be a lusty youngster, not unusually noisy, capable of drawing attention to its doings, able to get about quite a bit and perhaps a trifle timid but, nevertheless, giving promise of being able to presently walk alone and make its way regardless of obstacles. Its fondest friends even predict that it will eventually reach manhood's full estate, as it were, and fulfill the hopes of its originators by becoming the protector of our fields and orchards against the innumerable enemies, insect, fungous and bacterial, which not only arise within our boundaries but also persistently attempt to gain entrance and establish themselves as destroyers of our fields and crops.

It is readily conceded by the leading horticulturists that the Plant act, if wisely and properly administered, will afford adequate protection to the horticultural industries of the State against damage by insect pests and diseases and will also, by means of similar protection, make possible the development of fruit-growing industries which we do not now have or which have not yet developed to the point of being commercially successful.

The emergency created by the appearance of citrus canker in Florida has necessarily drawn the attention of the public to the campaign being waged against this disease by the Plant Board and this campaign has been so much in the limelight that it has overshadowed other lines of activity which are equally as important.

I have not chosen to discuss citrus canker matters on this occasion, although told that I would be expected to do so, for the reason that I would make clear the point that the Plant Board, in attempting to eradicate citrus canker, is performing but one of the functions required of it, and that there are other equally as important things for it to do.

Citrus canker is teaching us a lesson, a lesson being literally written into our horticultural history in letters of fire. The lesson is, that we should have kept it out instead of letting it in and then engaging it in a life-and-death struggle. The cost of victory in this struggle cannot yet be foretold, but it may easily reach upwards of a million dollars. The price of defeat on the other hand, will be, in the light of all information now available, the loss of Florida's most important industry. Of course we have no intention of being defeated, but the money and the resources required to win this battle, would not only have kept out this dread disease, but would have been sufficient to keep out many of the insects and diseases from which we have already suffered heavy losses and would also have provided for protection against other and more serious ones which even now menace us or which may appear in the future.

The fundamental basis of protection against plant diseases and insect pests is found in quarantine measures, rather than in methods of eradication or control. The extent to which this was realized by the State Plant Board is shown by the manner in which its work was organized. In approaching the problems before it, the Board decided to establish five departments, all of which were to be under the general supervision of one executive, known as the Plant Commissioner. These five departments are: Port and Railway Inspection, Nursery Inspection, Citrus Canker Eradication, Entomology and Plant Pathology. The first two of these are concerned with quarantine measures exclusively.

The Port and Railway Inspection Department makes the necessary inspections and enforces the necessary quarantine rules to keep dangerous pests and diseases from entering the State.

It is the function of the Nursery Inspection Department to prevent the dissemination of dangerous insects and diseases from the nurseries within the State. The importance of this phase of quarantine work cannot be overlooked for the nursery, in addition to being the distributing center for trees and plants, is also the greatest known distributing center for diseases and insects. The province of this department very properly extends beyond that of mere inspection and includes the tender of our services to the nurserymen themselves in assisting them to produce better and healthier trees and to help them in protecting their nurseries against infestation and infection.

The work of the Citrus Canker Eradication Department is known to all of you.

The parts taken by the Entomological and Plant Pathological Departments are almost as evident. These two support the other three branches of our work. The entomologist and plant pathologist, respectively, identify various insects and diseases encountered in connection with the port inspection, nursery inspection or eradication work and they also conduct such investigations as will bring to light better methods of controlling or eradicating dangerous pests and diseases.

On account of the necessity for giving prompt and energetic attention to the eradication of citrus canker last year, under conditions which strained every available resource, the inauguration of the port

and railway inspection work was somewhat delayed. However, arrangements were made late in the summer whereby the co-operation of the Federal Horticultural Board was secured and inspectors were located as rapidly as possible at Pensacola, Jacksonville, Miami, Key West and Tampa. These inspectors board all vessels arriving at these ports, and in addition examine and inspect shipments of nursery stock and other plant products which come into the State by rail or which are moved from one place to another within the State.

The work accomplished by these inspectors during their several periods of employment is of interest. During this time a total of 181 vessels arriving at these ports have been boarded by the inspectors, the character of their cargoes determined and, where necessary, inspected, and steps taken to prevent the landing by passengers of any plants or plant products infested or infected with dangerous pests or diseases.

In addition, 177 boats plying upon the rivers of Florida or on rivers entering Florida from other States have been visited for a similar purpose. At the points of entry 46 lots of fruit, flowers and plants have been inspected and passed. During the same time 44 lots have been confiscated because they were either infested, because they came from a country where dangerous pests occur, or because their entry was prohibited by the rules of either the Plant Board or the Federal Horticultural Board. Two consignments were returned to the points of origin and one consignment was treated and passed.

The inspection of shipments entering the State by rail and passing through the principal transfer points is considerably larger; 1,383 shipments of nursery stock which had been properly certified were examined by the inspectors and passed; 147 shipments of nursery stock which had not been properly certified and which were being shipped into the State in violation of the Plant Act and the Plant Board rules and regulations were inspected, found to be in apparently healthy condition, and were permitted delivered to the consignees in Florida; 24 shipments of nursery stock from other States, found upon inspection to be unsatisfactory, were returned to the shippers. Uncertified shipments of nursery stock discovered in transit to Florida points to the number of 22 were found infested or infected and were confiscated. These 22 confiscations were made for the following reasons:

Infestation by root knot, 7 shipments.

Infestation by both whitefly and root knot, 2 shipments.

Infested with dangerous scale insects, 4 shipments.

Excessive infection by crown gall, 1 shipment.

Infestation by camphor thrips, 3 shipments.

Excessive borer infestation, 1 shipment.

Containing citrus trees from canker-infected sections of other States, 4 shipments.

From three other shipments badly infested material was removed and confiscated and the remainder allowed to proceed to destination. Two shipments of citrus fruits have been refused entry to Florida because they had come from mar-

kets where they had been handled, examined and repacked in the same rooms and by the same people who had in a similar manner handled and repacked fruit from canker-infected sections.

Summing up the inspection work for the brief period in which it has been under way, we see that a total of 1675 shipments or packages of plants and plant products have been inspected and that the cargoes and baggage of 385 vessels arriving at Florida points have been inspected and dangerous material eliminated in both cases.

That the danger of introduction of pests through our ports is a real one, I may cite the instance of an oil vessel which arrived at Tampa on the 6th of this month from the ports of Tuxpan and Tampico, Mexico. Our port inspector at Tampa called on the captain of the vessel and asked him whether he had any Mexican fruits on board. The captain replied that he had previously purchased fruits in these two Mexican ports in sufficient quantity to thoroughly stock the ship's larder, but after putting to sea found all the fruit was maggoty and had thrown it overboard before reaching Florida. There seems no doubt but what the fruit in question was thoroughly infested with the Morelos fruit worm, and had the captain deferred throwing the infested fruit overboard until he had anchored in the harbor at Port Tampa, an infestation by this dreaded pest would have started on the Florida coast immediately.

On the 17th of this month our inspector at Pensacola intercepted a shipment of citrus budding-wood from a canker-infected nursery in another State. The shipment was sufficient for budding several thousand trees and was consigned to a Florida nursery.

The actual port and railway inspection work has revealed sources of danger never dreamed of. For example, badly infested nursery stock, uncertified of course, was found concealed in blankets in the heart of a shipment of household goods being shipped into Florida from another State. Florida fruits have been shipped to distributing points in other States, there handled and examined by the same people who examined and handled fruit from canker-infetced groves and then re-consigned to Florida points. Personal investigation at some of the fruit-distributing centers has revealed conditions which make it imperative that, in many instances, safety to our own State requires that even our own fruits be refused admission to Florida. At Key West last week the writer found that egg crates, coming from boll weevil infested States to the west of us, invariably contain Spanish moss as packing, this material being far and away the surest carrier of living cotton boll weevils during the winter and spring seasons. Fortunately, Key West is not in a cotton-growing section of Florida and this fact alone nullifies the danger. Nevertheless, the necessity of preventing the re-shipment of this same moss from Key West, as packing in other shipments, to the cotton-growing sections of Florida is self-evident.

When we consider how the Mediterranean Fruit Fly has succeeded in entering nearly every tropical and sub-tropical fruit-growing section of the world except those of the United States and the West

Indies, we cannot avoid the conviction that Florida has escaped, not through any precautions which her citizens have taken, but only through the rarest of good fortune. We cannot expect our lucky star to be always in the ascendency and continued immunity from this enemy will rest solely upon the efficiency of our port inspection service.

It might be interesting to review at this time some of the most important actions which the Plant Board has taken since its organization, in developing its protective system against insects and diseases from other States and countries.

Immediately upon its organization on May 4th, 1915, the Plant Board adopted a rule prohibiting the entry of citrus trees from the other Gulf States in which citrus canker was known to be prevalent. Enforcing this quarantine has been one of the most important lines of work in our Port and Railway Inspection Department. Investigations made in the summer of 1915 convinced the Board that fruit was being marketed in some of the other Gulf States from groves in which canker-infected trees were actually standing without any attempt being made to eradicate the disease or to prevent the marketing of fruit actually showing the canker infections. Inasmuch as considerable fruit from some of these states at certain seasons of the year is shipped into Florida, the Board on August 9th adopted its Rule No. 11 prohibiting the entry of any citrus fruits into Florida from Georgia, Alabama, Mississippi, Louisiana and Texas. At the same time it prohibited the entry of all fruits and vegetables from the Bermudas, where the Mediterranean fruit fly is known to occur, and prohibited all shipments from Mexico, where the Morelos fruit worm occurs.

Having in mind the protection of the agricultural interests of the State, as much as the horticultural interests, the Board has been constantly on the alert to take such steps as might protect field and vegetable crops against dangerous pests and diseases. Since its organization the Board has enforced a quarantine on cotton seed, cotton-seed hulls, Spanish moss and certain other products from the boll-weevil infested section to prevent the accidental carriage of this pest into the cotton-growing sections of Florida which have not yet become infested.

The quarantine against the Mediterranean fruit fly from the Bermudas is of just as much importance and value to the grower of tomatoes and other truck crops as it is to the growers of citrus fruits.

Realizing that every possible preparation should be made against the time when new pests will be discovered in the State or accidentally introduced in spite of our precautions, the Board at its meeting on February 14th of this year declared as "public nuisances" the Mediterranean Fruit Fly, the Mexican Orange Maggot, the Gypsy Moth, Browntail Moth, Pink Bollworm, Cotton Square Weevil, Mango Seed-Weevil, Avocado Weevil, Banana Root-borer, Cocoanut Bud-rot, Brown Rot of lemons and oranges, and the Banana Wilt Disease. Citrus canker had previously been declared a public nuisance. None of these insects and diseases, citrus canker excepted, is known to occur in Florida at the present time, but by declaring them public nuisances the Board has

prepared the way for beginning their eradication under existing laws the moment their presence in the State is discovered.

One of the most recent actions taken by the Board along the line of quarantine is also one which has attracted considerable attention. At its meeting on the 10th of this month the Plant Board adopted a rule prohibiting the entry into Florida of all citrus fruits from California. This action was taken upon authentic information showing that the brown rot in California, in previous years confined largely to lemons, had developed greater virulence and attacked oranges, affecting in some cases as much as thirty per cent of the crop. From the nature of the disease it is one which could easily be introduced into Florida in shipments of California fruit, and the Board would have fallen far short of the responsibilities placed upon it had it not taken steps to protect the Florida fruit growers against this added calamity when the information regarded its destructiveness and the means for preventing its introduction were at hand. No doubt there will be some objection to this quarantine by people who wish to import California fruits, but the end to be obtained more than justifies the means employed and this quarantine alone, if effective in keeping brown rot out of Florida citrus groves, will repay the State many times over for all funds expended for all purposes by the State Plant Board.

These considerations, we believe, justify the conclusion that the task of protecting Florida's fruit industry, the commencement of which was so long delayed, is but in its beginning and that on its future efficiency will depend, in large degree at least, the future of Florida horticulture.

There will be many difficult problems to solve and many hard battles to fight. Through it all, the support and co-operation of the fruit growers will be necessary for success. Mistakes will occur, for we are all human, and your patience may sometimes be tried by quarantines and restrictions which, at first sight, appear to be unnecessary, but you may rest assured that a spirit of justice, sincerity of purpose and a determination to accomplish the greatest good for the greatest number will ever be the motives guiding those in whose hands the work of the Plant Board is at present placed.

Florida Growers and Shippers League

Lloyd S. Tenney

It has been our custom for several years past to give the Florida Growers' and Shippers' League a place on our program. We heard the reading of their annual report by their Secretary, Mr. Lloyd S. Tenney. This report has been published as Bulletin No. 3 of the League. Those who are interested in receiving a copy of this report should communicate with Mr. Tenney of the Florida Growers' and Shippers' League, Orlando, Fla.

Packing and Shipping Citrus Fruits

OPERATIONS WITHIN THE PACKING HOUSE

C. W. Barnes

Mr. President, Ladies and Gentlemen:

The part of the subject "Methods of Packing and Shipping Citrus Fruit," assigned to me is the Operations Within the Packing House, and I will try to tell you how we do our work at Winter Haven.

In a co-operative association like ours it is necessary that each and every box of fruit from each and every grove be accurately and separately accounted for from the receiving of the fruit at the doors to loading into the cars and through all the books and records in the office and we feel almost absolutely sure that this is done, that each and every grower gets exactly the returns for the fruit he sends in, both as to grades and sizes, as each grower's fruit is run through by itself and packed out by itself.

To begin with, the field foreman sends in with each load of fruit what we call a loading slip or card upon which is written the name of the grower and the number of boxes on the wagon.

At the receiving doors of the packing house we have wagon receipt books which are made out in triplicate, one for the owner of the team, one for the grower of the fruit and one for the packing house records.

Each grower is given a number which he retains throughout the season and when his fruit comes in it is placed in rows on the floor and his number in large figures set up in a conspicuous place on each row of his fruit.

When the time comes to make a run of a certain grower's fruit the number of boxes on the floor are counted and compared with the wagon receipts to see that we have the correct number of boxes.

After the fruit has been run and packed out on the other side of the house the packed boxes are then checked and compared with the field boxes as a further precaution against mistakes.

At the end of the day's work the receiving clerk counts each grower's fruit that is on the floor and enters the amount on his individual record, bringing down the balance, which must balance with the amount on the floor, just as a bank gets its balance at the close of business each day.

So you can see that the way we check and recheck the fruit from beginning to end, there is very slight chance of any of it going astray.

Careful handling of the fruit in every way is insisted upon in the house, to re-

duce to a minimum the chance of decay which sometimes causes heavy loss to the growers.

To my mind the most important operation of all to avoid decay is that of perfectly drying the fruit. When packed, the fruit should be as nearly absolutely dry as it is possible to make it.

We believe we have the most efficient system of heating and drying the fruit of any in the State, and also the most economical from three points of view, installation, fuel and labor.

The installation of the system is very low compared with others that we know of, and would cost from $200.00 to $250 complete.

We first build a brick furnace about four feet wide, five feet high and seven feet long, with as many pieces of iron pipe running lengthwise of the furnace as we can get in and going clear through the furnace carrying the air from the outside into the dryer, the air being forced through by a large fan. It is built very much on the principle of the steam boiler, that is, heating the pipes which heat the air as it passes through.

The heat we use is supplied by an oil burner which costs about $50.00. The oil, which is of a low grade and costs about 4 cents a gallon delivered, is stored outside the packing house in an underground tank from which it is pumped direct to the burner just as used, so there is no labor connected with the operation.

The burner is lighted in the morning before work begins so as to get the furnace hot and then requires practically no care until we are ready to shut down.

We use a temperature of from 90 degrees to 140 degrees, just as the weather demands, never have any trouble drying the fruit, which is in the dryer only about 3 3-4 minutes.

After washing and drying comes the operation of grading, which is certainly not less important than any other and to my mind equally as important as packing.

I do not think any of us grade as carefully and well as we should and we probably never will until backed up by the grower.

The grower should know that it is impossible to fool the man who buys his fruit. This man sees many different packs and fruit from every section. He is a critic first and a buyer second, and will not take inferior fruit until the best fruit is sold and then only at a heavy discount. He knows the different grades as well as we do, if not better, and if your fruit is not up to grade he is not backward about telling you so.

It is possible that there are but two grades of fruit in California, but that is certainly not true of Florida.

We have three absolutely distinct grades here and probably four if our third grade was graded properly.

It is my personal opinion that our third grade should be made a thoroughly good grade of russets, into which should go fruit equally as good in quality as into the first two grades only darker in color, and I believe we would get enough money more for the grade to justify it. Our present third grade is a composite one of good, poor and indifferent fruit.

After the fruit has been properly graded, then it should be carefully and neatly

packed and it should be packed as high as possible without injuring the fruit when the top is nailed on.

I think it likely that professional fruit buyers are not very different from the common run of humanity. If we had a row of baskets of peaches in front of us and all of equal quality, but some better filled than others, it is not hard to guess which would be the first to go, so I think it advisable to fill our boxes full.

I feel quite sure that if your fruit is properly graded, the boxes well filled and neatly packed, there will be no doubt about it selling at or near the top price of the day's market.

If we could put ourselves in the buyer's place we would realize that only honest fruit, honestly packed, will sell to the best advantage.

There is no mystery or sleight of hand or anything of the kind about getting a price for your fruit that will average with the best. If your house is not well known it will soon become so by carefully handling, grading and packing your fruit.

HANDLING CITRUS FRUIT IN THE FIELD

A. W. McKay, Orlando, Fla.

At the meeting of the Florida State Horticultural Society in Tampa last year, Mr. David Scott gave a very interesting review of the development of methods of handling and shipping citrus fruit in Florida. I wish to avoid any duplication of Mr. Scott's paper, but I believe it is advisable now to review briefly the progress of the last decade. As you all know, improvement in handling methods has been most marked during that period, and, as some of you may have forgotten, the season just past is the tenth since the experiments of the United States Department of Agriculture on the handling and shipping of citrus fruit were begun in Florida under the direction of Mr. Tenney.

At that time, and even more recently, there was not a modern packing house in the State. There was not a grading belt, an improved washer or sizer, or an artificial dryer anywhere in Florida. The handling of the fruit in the field and in the packing houses was universally rough. Pickers were paid by the box, and it was not uncommon for an active man to pick a hundred boxes of oranges a day. No attention was paid to long stems and clipper cuts. The fruit was subjected to much dropping and other rough handling. In the packing houses large hoppers holding twenty boxes of fruit, or more, were the rule. Grades were not dependable, and packs were flat, irregular and unattractive.

These conditions seem very crude to us today, but I believe we shall make progress in the next ten years that will make present day conditions also appear crude. The habit of progress is becoming fixed with us, and we are not as easily satisfied as we were.

With the building of modern packing houses, there has come, along with more careful handling, improvements in the grade and pack of the fruit. The best packs of only five years ago would look slack and untidy beside the best brands of today. The grades are more dependable. More attention is also paid to loading the cars and to stripping and bracing the load. The methods employed in the packing houses will be described in detail by other members of the committee. I wish to deal most directly with the handling of the fruit in the field.

This has always been, and is still the weakest link in the chain. More decay is caused in the field than at any other point in the handling operations. No matter how efficient the machinery and system of the packing house they cannot remedy the injury caused by poor field work, and too often the value of expensive machinery is nullified by this injury.

There are several reasons why field handling is difficult to control, of which the following are probably the most important:

1. Unsatisfactory labor.
2. Inefficient supervision.
3. The method of paying pickers.
4. Condition of equipment.
5. The constant shifting of the field of operations.
6. The desire of many growers to pick their own fruit.
7. The general tendency to sacrifice care to cheapness.

A number of these can be only partially remedied; others can be entirely eliminated. The class of labor obtainable for picking citrus fruit will always be poor on account of the shortness of the season and the uncertainty of the work. However, we should be able to obtain better field foremen than we have, or at least we should be able to impress those we have with a clearer idea of their responsibilities, and to arouse their interest to a greater degree. This can not be done unless the "man higher up," that is the packing house manager or owner, checks up the foreman and insists upon care and efficiency. The foreman's duties do not cease, as so many of them believe, with counting tickets, keeping time and seeing that the field boxes are properly filled. An inspection of the work of each man under him, an actual count of the number of clipper cuts and long stems in one or two boxes of each man's work, and close observation of the manner in which he handles the fruit is also imperative. Some packing houses go to the expense of hiring one or more inspectors for this work. If the picking foreman, after he is started on the right track, is not competent to make these inspections, or does not show enough interest to make them, he is not the man for the job. He should, however, be under the direction of the packing house manager, and if the latter cannot find time to pay attention to his field work, possibly he is also in the wrong place.

There is considerable discussion at present as to whether pickers should be paid by the box or by the day. If a man is paid by the box, we are told, he picks a much larger quantity than if paid by the day. On the other hand, he is practically certain to handle the fruit roughly. If he is paid by the day, he may or may not handle the fruit carefully, but the re-

duction in his output is depressing. Both methods have their disadvantages. In fact they seem to be composed largely of disadvantages.

It seems to me, entirely practical to adopt some method of taking account both of the quantity of fruit a man picks, and also of the quality of his work. If he is paid by the day the amount could be determined by a sliding scale, based about equally upon the amount of fruit he picks and its absence from clipper cuts and other evidences of rough handling, as determined by daily inspections by the foreman.

With regard to condition of equipment, it is somewhat difficult to keep material so widely scattered as field boxes, sacks and clippers must be, in a perfect state of repair. However, this can be done with a little attention, and by so doing a prolific source of injury to the fruit is removed. In most packing houses broken boxes are sorted out and repaired before being returned to the grove. Picking sacks and clippers should be frequently inspected by the foreman and repaired when necessary. Clippers should be oiled and sharpened often. In this connection, I would advise that nothing but the Tuttle clipper be used. It is impossible to cut the fruit with this clipper, and as the picker can cut closely without danger long stems are also eliminated.

The constant shifting from grove to grove, and frequent stops on account of market or weather conditions are all factors that tend to demoralize a picking crew, and make care and economy difficult to practice. The success with which this problem is solved will depend most largely upon the personality of the foreman. The responsibility of holding his crew together and of resuming operations with the least possible lost motion rests upon him.

Many growers wish to pick their own fruit, although they may be shipping through a packing house which has a trained crew. Their reasons for this are usually those of economy. Sometimes a grower may fear that an outside crew will injure his trees, may not pick them clean, or possibly may not handle the fruit carefully. He has a very natural belief that he can pick his own fruit better and cheaper than anyone else.

As a matter of fact he cannot pick it better, and if he considers his own time he cannot pick it cheaper than the packing house crew, if the latter is properly organized. The bane of the conscientious packing house man is fruit of the grower's pick. It is, with few exceptions, poor. The only efficient way to gather fruit is by a picking crew under the direction of the packing house and under competent supervision.

I have given as the last difficulty in field handling, "The general tendency to sacrifice care to cheapness." Fruit should be picked economically, but never cheaply, if cheapness means rough and careless handling. As a matter of fact, I believe that field work should cost more than it does at present. In the past ten years there has been an increase in the cost of packing fruit of probably ten cents a box, and this increased cost has largely been the result of increased care in handling the fruit, and the output of a more attractive package. You cannot afford to let your field methods lag behind. The maximum in-

crease in the cost of field work should not exceed two cents per box, and this should cover a change from the most careless to the most careful work. However, do not think that an increase of two cents a box in your picking charges will solve the problem. You can easily spend this money and get nothing in return. In many cases no doubt the best results can be obtained without any increase in cost, or possibly with a reduction of the present charges. Care and economy combined give us efficiency, and it is efficiency for which we are striving.

T. Ralph Robinson

Mr. President, Ladies and Gentlemen:

The chief point I would emphasize has but an indirect connection with the picking and shipping of citrus fruits.

In every field of industry the modern aim is to "let machinery do the work." Machinery has worked wonders in improving the citrus fruit package, but there is danger in depending too much on it. When machines for washing and polishing fruit become as perfect as some of the outfits now in use, there is a tendency on the part of the grower to assume that any fruit can be made attractive, no matter what its age, race, or previous condition of servitude.

It would be a boon to the industry if, for a season, we were deprived of the use of mechanical washers and were compelled to produce fruit that would pass inspection as it is clipped from the tree. What would be the effect of this? I venture to say there would be such an impetus given to spraying, pruning and better cultural methods, that much of our citrus crop would actually be fit to eat and offer for sale without going through a complicated citrus laundry. If it is possible to produce clean, bright fruit, I believe that it will carry better and make a better appearance in the market if it is simply "dry cleaned;" a brush and polisher is all that such fruit requires; the natural oil of its skin is a better polishing agent than any coating of paraffine, in my experience. I do not wish to imply that it is always possible or even economical to produce fruit that will not require washing, but I do believe that we can greatly improve our "batting average" in this respect. "Let machinery do the work" by all means, but don't put it all in the packing house. Put spraying machines in the grove and begin to grade your fruit long before it reaches the grading belt.

Last summer I had the pleasure of visiting a few of the splendid packing houses in Southern California. I noticed in the Chapman house, the home of the "Old Mission" brand, one minor detail that may help to explain the pre-eminence of this famous brand. On the upper side of the packing bench was inserted a strip of looking glass, at such an angle that the packer, as he placed the last row of oranges in the bottom layer could see at a glance whether or not there were any "open faces," any wrappers that had split. It is such attention to detail that can make or break any citrus brand.

Irrigation Methods in Florida

NEED FOR IRRIGATION IN FLORIDA CITRUS GROVES

F. W. Stanley, U. S. Dept. Agr., Orlando, Fla.

The need of irrigating groves in Florida is a question of much discussion. To estimate the number of irrigations needed in the last 24 years, it is necessary to have some medium of comparison. We have for this purpose a portable pumping outfit at Orlando with 500 feet of hose. With this outfit we can irrigate portions of a grove and thus by direct comparison come to some definite conclusions. We have also records of irrigated groves in Orlando since 1909. The test plots were irrigated when the soil was dry. The soil moisture was determined by laboratory tests, samples being taken every foot to a depth of 6 feet. In connection with above, tests were made in running water in furrows. Some of the results were shown graphically at last year's meeting at Tampa.

The number of irrigations that could have been practiced in the past have been estimated as follows:

Year.	No. of Irrigations Estimated.
1892-1893	4
1893-1894	2
1894-1895	1
1895-1896	2
1896-1897	4
1897-1898	6
1898-1899	1
1899-1900	0
1900-1901	0
1901-1902	0
1902-1903	0
1903-1904	0
1904-1905	0
1905-1906	0
1906-1907	10
1907-1908	3
1909-1910	2
1910-1911	2
1911-1912	0
1912-1913	0
1913-1914	4
1914-1915	1
1015-1916	2

(to date, April 25th).

From a study of the above it will be seen that the need of irrigation has been at very irregular periods. The first seven years all show that irrigations could be practiced, with more or less profit, while the next seven years show that irrigation probably would not be needed. The last

period shows a preponderance of irrigated years, although some of them were not particularly droughty.

It is probable that some of the irrigations could be eliminated without loss, but when two or more irrigations are shown adjacent, it is not probable that both could be eliminated, without some loss, although other conditions, such as temperature, cloudiness, etc., can have considerable influence. Taking the figures as they stand, we estimate that about one-half of the years will call for irrigation. If we eliminate the doubtful ones we find that there are probably about five or six more years that would be called fairly good years. This means that about one year in three will call for irrigation.

A further study of the column above shows how useless it is to attempt to prophesy what year will need irrigation. Nevertheless it was a common assumption after the wet years of 1899-1905, that irrigation would never be needed. It was at this time that most of the existing plants lapsed into disuse, many of them never being in a shape to operate since that time. It is interesting to note that the dryest year on record, 1906-07 followed immediately after the seven wet ones. This season contained ten dry months, five of the months being without a drop of rainfall. The year 1897-98 was nearly as bad.

It is not to be assumed that if a grove is not irrigated in a very dry year that there will be no crop the following season, as the summer rains usually bring forth a new (June bloom) that produces a crop, usually of inferior grade and value. But the tests of the last few years show that irrigation is needed on much of the high pine land and lands with shallow soils in order to hold the early spring bloom. There is no doubt that scientific irrigation would increase the market value of the fruit and promote the health of the tree even when there was not an actual need of irrigation to save a crop that was burning up.

This spring (1916), has been very dry in some parts of the State. One of the groves we are irrigating at Maitland has lost practically all the early bloom, although the bloom was very heavy. The one exception to the general loss of fruit in this grove are the few irrigated trees we have cared for with our experimental outfit. These trees have a full crop, with a promise of a fine quality of early fruit. Some of the fruits are as large as a walnut, and at the same time these trees are putting on a new bloom. The unirrigated trees will doubtlessly lose all the early fruit if rains do not come immediately and even if a good June bloom develops, the trees will probably be permanently set back. The late bloom has never amounted to anything on this grove, but there has been enormous losses from dropping of fruit due to drought for the past four years.

The length of this paper will not allow a further discussion of rainfall and need of irrigation, and there is no space for a discussion of the kind of plant to install, but this subject has been quite fully discussed in the last three records of the proceedings of the Florida Horticultural Society. The few remarks above go hand in hand with conclusions drawn from other

sources which in a few words are as follows:

Irrigation in Florida is entirely supplemental to the rainfall and not a necessity as in the west. There will probably be a series of years that will call for no irrigation, and others that will need almost continual watering. Therefore a plant should be constructed with the least possible outlay of money and at the same time should be durable, with the minimum of depreciation. The low pressure systems using terra cotta sewer pipe, as distributing lines can be used for nearly all Florida groves. Such an outfit is cheap, and practically everlasting, but it must be laid out by an expert, as the low pressure pipe needs to be installed with suitable safety devices, and under suitable pressure heads.

A great deal of the work which the Department of Agriculture has been doing in irrigation, has been done in Florida. We work in the northern part of the country during the summer, which are their dry months, and in Florida during the winter, which are your dry months.

I have made quite a number of short addresses to this meeting, but we have not been able to give you any very definite conclusions because it takes a great many years to reach conclusive proofs. We have not come to conclusive proofs now, but we hope we are getting to them. * * *

As I have said, terra cotta sewer pipe is very satisfactory. It is everlasting. Of course, it has to be put in under the supervision of an engineer. But we are willing to help anyone who wants anything of that kind.

I have had reports and visited some of the groves where the irrigation has been installed. The Terra Ceia grove has put on a heavy bloom, where others, not irrigated, have not.

Do not sub-irrigate a grove unless you have the right conditions. You must have a hard pan close to the surface and the ground must be apparently level.

There have been good results from tile drained groves. Again, we have made experiments in sub-irrigating and had good results for a year or two, but later on they became clogged with roots. I do not know whether sub-irrigation will be good ten years from the time it is put in, or not.

We know that irrigation of truck is almost essential. We are interested in the truck subject, but I have not time to go into that.

As I have said before, we have talked this terra cotta pipe irrigation for five years. It has rained more or less and you have not taken enough interest in them to put them in. Mr. Warner of Palatka put in a system and it cost him $22.50 per acre; that is, the distributing system alone. He had a flowing well and that does not include the pumping system. One man can take care of it. He had to use a portable pipe in connection with it, in some places.

Thank you.

The Department of Agriculture will be glad to give any advice along these lines, and a personal survey can be made in most cases if advance notice is given. Write Irrigation Office (Office of Public Roads), Dept. of Agriculture, Washington, D. C., or F. W. Stanley, Orlando, Fla.

DISCUSSION

Mr. Thompson: It has been a number of years since we had very much experience with irrigation. As you know, there are a number of lakes around Winter Haven, and we had two pumps of about six-inch suction and five-inch discharge installed with a five-inch main running through the full length of the grove. Our system was to use the furrow system, putting water on the ground and plenty of it, following it down the rows in squares and having it so that we could control it, and using plenty of water.

After irrigating a block quite a little space, we went over it with a harrow and conserved all that moisture. We had to use it only once a season and we used it two seasons in succession. Since that time the rains have come along that we thought would do the work, although at times it became quite dry, but we have never irrigated since. We never had the time. In our system it took so much help and we were always crowded with other work and we depended on the rains.

This year we felt the need of it, but like in former years, we put it off, using harrows very freely. Finally the rains came and we have a good bloom. What we will have as a crop, the future will show.

If a system could be installed as Mr. Stanley has described, easily manipulated with a small amount of help, I believe it would pay to put it in, but I am not prepared to say that year in and year out the system we have or the overhead sprinkling system, as some have, will pay.

Mr. Robinson: Mr. Stanley mentioned one or two years ago the use of galvanized conductor (?) pipe in distributing water as they do in the west. This year I found that has been a great help. We used the furrow system with hydrants located at the high points of the grove, but since we put in drain pipes in a great many places, it is difficult to get the water to cross the drain. We used canvas hose and various contrivances until we found the conductor (?) pipe would carry three or four times as much water and cheaper than hose. In moving a joint of this pipe to transfer it to another part of the grove, a man can put a few of these on his back, it does not make much of a load.

Mr. ——: Will the roots of the trees disturb the pipe in the underground system?

Mr. Stanley: The pipe must be laid very carefully. That is the reason why I advise the services of an engineer. The joints must be covered in some manner. There is no excuse, if the system is installed carefully.

Mr. ——: I would like to ask as to the amount of rainfall really essential to determine the necessity for irrigation. We have had an average in February of 2.70, April 2.59, in May it goes up to 6.00. In October it goes up to 10 inches and then drops down to 2.00. This is the average of some twenty-one years. What is the minimum necessary to determine the necessity for irrigation? Of course, you don't want excessive moisture in your soil, neither do you want too little.

Mr. Stanley: I can give you the per cent of moisture you would need in your soil. You need four or five per cent of moisture. The citrus tree is a peculiar

tree in that it will go for a month when there is no available moisture in the ground. Right now, in points in the central part of the State, you will find the ground as dry as powder down six feet, and still those trees will live, but it is a question whether trees should be permitted to get to that stage. Sometimes it will hurt the bloom, which may come out again when it rains.

I cannot tell just how dry the soil should get, nor the number of inches of rain that should fall before you start the irrigation system working, but if I wanted to get the maximum amount of fruit and keep my trees in the best condition, I would keep the soil in a moist condition. From the time the buds start, the first of February, until the rainy season, your soil should be kept in good shape. You should irrigate every two or three weeks and give it a good wetting. The roots will take up the available moisture in three or four days.

The size of the tree materially decreases or increases the amount of moisture taken out of the soil; small trees may not need so much irrigation where a larger tree, to get the best results, will demand it.

Mr. ——: After a rainfall, how soon should you cultivate with an Acme harrow?

Mr. Stanley: I don't know. It would seem to me it is better to wait a day or two until it begins to dry out instead of doing it immediately after the rain.

Mr. Sheppard: We wait until the top is dry about half an inch to one inch, if possible; not before. I have found people doing it the same day and loosened up the ground and every bit of the water would evaporate. Let the water go down and then commence to harrow.

Fertilizers

FERTILIZER FRAUDS, FAKES AND FANCIES

R. E. Rose, State Chemist

Mr. President, Members of the State Horticultural Society, and Particularly My Friends of Arcadia:

Mr. Rose: I am happy to meet and greet you all. I have known Arcadia perhaps as long as a large majority of her present citizens. I knew the spot where Arcadia is located before the railroad got here and your county seat was at Pine Level, when our recent late friends Ziba King and ———— Whidden were the principal residents of this section.

I have watched her progress with a great deal of interest, because the whole of South Florida was in a condition similar to Arcadia when I first came to the State.

The various papers that have been read and addresses given at this meeting, have had for their key-note, the necessity of co-operation. The co-operation of the citizens of Arcadia have made the present city of Arcadia.

Probably the first systematic co-operative effort in Florida was the organization of the Florida State Horticultural Association some twenty-nine years ago. I have been a member of it for about twenty-five years. There are men who are older in the association, and a few, only four, of the original members left.

As a result of the co-operation in this Society with the citizens of the State, we have made a considerable advance, not only in the art and science of horticulture, but in the legislation for its protection. The movement for our nursery law was inaugurated by this association. Its first passage was in answer to a demand from this Society. It was not what we wanted, but it led to the fight for the present Plant Board and the generous appropriation by the State Legislature for the purpose of eradicating our present menace of citrus canker.

However, my subject will not be co-operation; the title of my paper is rather alliterative—Fertilizer Frauds, Fakes and Fancies. It is a revision of an address which I formerly made to the agricultural students of our agricultural college and university.

I need not say that while I have addressed a great many audiences, I have never gotten over that which generally affects young ladies—stage fright, except sometimes when we have a row on hand, when I forget all about it. You remember we had an incident of that kind at DeLand.

Probably no class of citizens are more subject to the wiles of the faker, the slick-

tongued, plausible peddler of patents, of fabulous fertilizer formulas, of wonderful new plants and seeds, of cures for all the ills of man or beast—specifics for all troubles, physical and financial—than are the farmers of this and other countries.

The late P. T. Barnum was right when he said "the American public like to be humbugged"—and that a "sucker was born every minute." These conclusions by Mr. Barnum as to the gullibility of the public are as true today as they were years ago. The desire to "obtain something for nothing" is apparently as prevalent now as ever, in spite of the campaign of education so vigorously being prosecuted through our Agricultural Experiment Stations, Farmers' Institutes, and Agricultural Demonstrators, both State and National.

I wish to say, however, that the Florida Citrus Grower and Trucker, particularly the members of this Society, are, as a class, not prone to be deceived by these fakers; as no class of agricultural workers are better posted as to the fertilizer requirements of their crops of fruit and vegetables than are the citrus growers and truckers of Florida, particularly the older and more experienced ones. They generally know what they need and know when they get it. They demand such goods as experience has proved to be best adapted to their various crops, under full guarantee by legitimate manufacturers and dealers. They, as a rule, are not "taken in" by the propagandas of such fakes as "bread from stones," "new mineral fertilizer," "vithumus," "feldspar," and other similar frauds, spaciously advertised, and given much free advertisement, by so-called experts, with the usual certificates of wonderful results obtained by their use —particularly when combined (as directed) with an abundant supply of stable manure.

I regret to say, however, that some of our older citrus growers and a considerable number of those recently coming into the State, have been made the victims of these plausible propagandas, though I am also pleased to note they have not, in most cases, pinned their entire faith to these "old frauds" under "new names," but have continued to use the brands of legitimate, reputable manufacturers, for fear the "wonderful new materials" might not work out satisfactorily. Any results obtained by the use of stable manure or available phosphate, nitrogen or potash, however, are credited to the "new wonder," evidently to justify their credulity.

The farmer, generally being honest himself, believes in the universal honesty of mankind, hence is readily seduced by these plausible gentry, who glibly describe the great value of their goods, of their methods, formulas, seeds or plants, and the great boon they desire to bestow on the farmer for a valuable consideration, including the exclusive right for his county or neighborhood to use or to sell to his neighbors the wonderful fertilizer, feed stuff, plants or formulas, made from materials found on any farm, together with some newly discovered secret substance that the vendor will furnish—for a valuable consideration—the farmer's cash, or probably his note, at three or six months, which he immediately proceeds to discount at the nearest bank.

A number of these formulas and the

"secret patent substances," costing $5.00 for enough to make a ton of excellent fertilizer from a ton of road dust, equal to the best fertilizer costing from $30.00 to $40.00. These "secret substances" proved in one case to be five pounds of copperas (iron sulphate) and ten pounds of washing soda (carbonate of soda). The farm right was sold for five dollars, with enough of the "Glupep" (copperas) and potash (washing soda) to make a ton, when mixed with a ton of road dust.

Another uses 1,500 pounds of saw-dust, 300 pounds of stable manure and 200 pounds of the "secret patent substance," which proved to be common salt. This formula is also sold for $5.00 for each farm right, with the exclusive right to purchase, at $5.00, additional amounts of the "secret substance" to make a ton. A very handsome lithographed certificate of ownership is given, under pledge of secrecy and forfeiture of rights in case the secret is divulged. Hundreds of both these fakes have been sold in this and other States.

I shall not discuss that old fraud "Egyptian wheat," the seed of which was taken from the wrappings of the mummy of an Egyptian potentate; nor the "Blue rose," and "alligator plant," cuttings from our ordinary sweet gum, with cork excrescences.

The various tonic and condition powders, which save 50 per cent of the feed bill, and cure anything from colic to ringbone, hog cholera, mange and distemper. Fortunately, most of these nostrums are harmless, generally composed of copperas and salt, with a little saltpeter. The powders are, in most cases, charcoal, copperas, sulphur and saltpeter, and fenugreek, mixed with about 90 per cent of linseed meal, or similar vehicle. They generally sell for about 25 cents a pound at retail—$500 per ton (with 50 per cent discount to the dealer).

There is no good reason why the farmer should be swindled by these fakers. What, with the spread of agricultural literature, the various bulletins of the U. S. Department of Agriculture, of the State Experiment Station, State Colleges and State Department of Agriculture, all of which can be had for the asking, there is no legitimate excuse for this ignorance on the part of the farmer.

What, with the teaching of rudimentary agriculture in the common schools, the farmers' institutes, and farm demonstration agents under the Smith-Lever Bill, the agricultural college, and particularly the farmers' short course, now common to all our agricultural colleges, the prejudice against "book farmers" is to an extent passing away; with our present large class of bright, earnest young men in the agricultural college, the intelligent demonstration of agricultural truths by the State and county agents, it is to be hoped that in but a short time—only until our boys can become men—will this condition of credulity prevail.

Not only the art of agriculture (the how) will be practiced, but the science (the why) will be known, and farming be classed an exact science, as are all other sciences. In this connection I quote from a paper read last year, quoting from an admirable article by Assistant Secretary of Agriculture Carl Shurz Vrooman:

"This country has spent over two hun-

dred millions of dollars in bringing out nuggets of truth for the farmer, yet I dare say not ten per cent of this wealth has been put into general circulation among the farmers, who pay taxes to support our agricultural institutions.

"It is not derogatory to the scientist to say that he has done a lot of valuable—and you might say invaluable—work which has never been available so that the farmer can use it to advantage. The scientist has done his work well. We have many such in the department who have discovered facts that could be made of great value to the farmers if the rest of the machinery of the department were to take those facts and work them up, as a cook works up raw materials from the grocery store into food for the table.

"If the American farmer would put into practice the scientific methods of agriculture that already have been worked out at the expense of government funds, and if prices held, he could increase his yield of corn and wheat alone by more than ten million dollars' worth for every growing day of the year.

"It cannot be questioned that the efforts of this department and of the agricultural colleges have lost in practical efficiency because the scientists, in their search for truth, too often have missed the farmer's view-point..

"Right in this department is a gold mine of agricultural information that, if made available for practical application, would revolutionize farming in this country. But not ten per cent of this agricultural knowledge has actually been made available for the majority of our farmers.

"Science is something that wins—not temporarily but permanently. And scientific agriculture, to my notion, is agriculture such as we'd like to have it—agriculture made efficient; agriculture conducted along successful lines in every sense of the word. To bring about this condition—and that is the avowed function of the department—we must seek and deliver truths in terms of the great out doors. We must tackle all farm problems and give definite and practical instructions—complete the circuit. We must think the farmer's thoughts and speak his language.

"The Smith-Laver Bill is the greatest effort at university-extension work that has ever been seen on this planet, millions of dollars being devoted to the democratizing of learning—to taking all the combined agricultural knowledge of this country, and of other countries, and bringing it right down to the barnyard of every farmer in the land.

"Presently no farmer will be too poor or too ignorant to get a county agent to come and look at his problems, diagnose his troubles, and tell him what to do.

"We are not going to stop publishing the results of our scientific investigations in scientific language for the use of the scientific world; but we are going to do, on a much larger scale than ever has been done before, this job of taking everything of practical value in the discoveries of the scientist, co-ordinating them, and adding to them business advice based on scientific business investigations.

"We are going to give the farmer, as a finished product, instructions that will show him not only how to meet one difficulty, but many difficulties he runs

against in his farm operations throughout the year. In other words, we are going to teach him not merely how to reform his methods, but how to revolutionize them."

I had intended to discuss various propagandas, clever advertisements of certain fertilizer materials, stressing the value of the peculiar element contained in the material offered. While these propagandas are legitimate, the value of the substances used alone are exaggerated; a fertilizer, like a feed, must be balanced. Neither potassium, nitrogen or phosphorus alone make a fertilizer. Each of these elements must be furnished in proper proportion. Hence these propagandas of the potash, nitrate and phosphate dealers must be taken with considerable allowance. Combined properly, they are all valuable; in fact, necessary. Separate, they are not. However, it "takes a crank to turn the world," and the rider of a hobby develops the speed and bottom of the animal and brings out the weak as well as the strong elements of the hobby.

I desire to say, however, that very frequently the farmer deceives himself, not waiting for the faker to come along; he insists upon purchasing his "guano" on the ton basis, giving no heed to analysis showing the exact percentage or number of pounds of valuable elements—the nitrogen, soluble potash and available phosphoric acid in each hundred pounds in the ton, be it great or small.

In low grade goods, an excessive price is paid for inert material put in simply to satisfy the farmer's demand for a cheap ton. Fillers, or make-weights, are not used in high-grade goods, simply for the reason that there is no room for them in the ton. Goods costing $35 to $40 or $50 per ton are generally, in fact, in most cases, far cheaper than low-grade goods costing $20 to $25 per ton. In other words, you pay less for the actual plant food. You get more fertilizer for each dollar spent than if you purchase 500 to 700 pounds of filler and pay the freight on it than if you paid the same price for 1,300 to 1,500 pounds, containing the same plant food.

The manufacture of low-grade goods is in direct response to the farmer's demand for "cheap goods," which are always costly. It costs money to haul in slate or clinkers, to grind them and mix and to sack them, all of which is charged to the farmer, hence he deceives himself and pays the penalty when he demands "something for nothing," and insists on getting a ton when he pays for only 1,300 to 1,500 pounds of commercial fertilizer.

Mr. Heimberger: It has been some ten years since I have had the pleasure of meeting with you, and that being the case, I thought your honorable president would have forgotten me, but I can say that I never will forget him nor Prof. Rolfs, for I am one of their old boys; I don't know whether they are proud of it or not, but I am. They put me through four years of the hardest work I have ever done in my life.

Reads paper.

THE POTASH SITUATION

L. Heimburger, Ass't State Chemist, Tallahassee

Mr. President, Ladies and Gentlemen:

The great European conflict transpiring at the present time has affected the fertilizer situation in our native State most vitally.

Firstly. By shutting off our one and only great commercial source of soluble potash salts—the highly developed deposits of the Strassfurt fields in Germany.

Secondly. By the greatly increased selling price of sulphuric acid, our only commercial solvent for making available the phosphatic content of our raw phosphates. The munition manufacturer's demands for sulphuric acid being greater than our country's normal supply.

Thirdly. Very high ocean freight rates have very materially augmented the prices of all those many agricultural chemicals imported from abroad, as nitrate of soda, sulphate of ammonia, etc. Also high grade imported pyrites are so largely used in the manufacture of sulphuric acid.

Certain chemical elements are essential to the growth and development of plants, and thanks to the great work of the savant, von Liebig, some fifty years ago, the question of plant nutrition has been thoroughly grounded on scientific fact. Among many other things, Liebig proved that there could be no substitution in the plant nutrition question, that an excess of one essential element could not take the place of a deficiency in another, or in other words, that there can be no substitution in whole, or in part, of one element for another. I am sorry to state that there are some fertilizer manufacturers, who today, are endeavoring to upset these truths, due to the absence of potash supply.

Again, Liebig has taught us that these essential elements of plant nutrition must be in the form of a solution before they can be assimilated, and used in the process of metabolization.

Again, I must state for the same reasons, that there are dealers in substitute, fake plant foods, who are endeavoring to defraud the purchaser by selling fine ground "stone" for soluble potash salts, and "floats" for acid phosphate.

Years ago, though, thanks largely to our present State Chemist, as if anticipating the present contingencies, the drafters of our fertilizer law incorporated the small words, "water soluble" before "potash," and "available" before "phosphoric acid." So now, if any fertilizer purchasers are defrauded, they can blame none other than themselves for not using their eyes, to read the guarantee printed on the tags, required by law.

We are hearing much at present of the many virtues of lime, especially in its so-

called power of liberating insoluble soil potash. At best, this is very largely theoretical and the facts are not borne out by a single perfectly conducted experiment. Again, to produce a workable theory, a soil rich in insoluble, unavailable potash is a prerequisite, and it is a well known fact, that *all* Florida soil types are notably deficient in potash. This statement applies even to the red clay soils of the Orangeburg and related series, common in the northern tier of counties of the State. The general statement that clay soils are rich in potash, does not apply here, for the reason that these clay soils of Florida are not derived from the decay and breaking down of feldspadic and similar high potash bearing rocks, but from the disintegration of limestone, which always contains relatively small amounts of potash.

Due to the great world war, our annual importation of German potash salts of something over a million tons, has practically ceased, resulting in a potash famine. When just before the opening of hostilities muriate of potash could be purchased at American seaports at about $33 per ton, it is now very hard to find small lots at from $450 to $500 per ton. This has resulted in a great cry from the American farmer and manufacturer, for supplies of soluble potash from native sources. Study and investigation by the government and private individuals, has brought to light the following possible potash sources of commercial value, viz: Saline residues, natural and artificial bitterns, alunite and similar minerals, igneous potash-bearing rocks, and minerals like the potash-bearing feldspars, and organic sources of potash as seaweed (especially the giant kelps of the Pacific coast), molasses residue, wool scourings, etc.

Among the most promising commercial sources of potash found in our country, are the Giant Kelps of the Pacific coast, and the brines from the lake basins of the arid West. Of all the kelps found growing in our Pacific coastal waters, there are but two species of these giant algae—*Nereocystis* and *Macrocystis*—that are of economic value. As the former is an annual and the latter is a perennial, *Macrocystis* is of the greater economical value as a potash source, for the reason that a number of crops can be gathered each season without any injury to the groves.

These giant kelps are found growing in great groves in water, at an average depth of fifty feet wherever the ocean floor is sufficiently rocky to furnish suitable anchorage for these algae. These groves extend from off the western coast of Mexico to well up the Alaskan coast. The best located groves, from a commercial standpoint, are those located off the southern coast of California, near San Diego and Santa Barbara, and the Puget Sound groves. A careful government survey of the San Diego and Santa Barbara groves shows that these areas will yield about 1,200,000 tons of wet kelp per cutting, and as these beds are practically pure growths of *Macrocystis,* several cuttings can be harvested annually. The annual yield would be very much larger than these figures given. A large amount of technical work has already been done with these kelps with commercial objects in view.

The fresh kelp (*Macrocystis*) as harvested, shows something over 86 per cent

water. On this basis approximately 6.24 tons of the fresh kelp would be required to furnish one ton of air dry material containing about 16 per cent moisture.

An analysis of the fresh kelp shows:

Moisture	86.41%
Ammonia	0.23%
Potash	1.82%
Iodine	0.03%

A commercial value of $3.26 per ton is given by one authority, of which $1.44 is given as the value of the iodine and $1.82 for the potash and ammonia.

When the iodine is recovered the potash is saved as a high grade salt, but if the fresh kelp is merely dried and ground for preparation for market the iodine value cannot be considered. Giving the normal values of $3.60 per unit for ammonia and 75 cents per unit for potash, the commercial value of air-dry kelp containing about 16 per cent moisture, is approximately $12 per ton. It requires 6.25 tons of fresh kelp to produce one ton of the commercial air-dry article. The air-dry ground kelp contains from 13 to 15 per cent potash, 1.25 to 2.50 per cent ammonia, 0.75 per cent phosphoric acid and 0.20 per cent iodine. Charred kelp contains from 30 to 35 per cent potash and a little over 2 per cent phosphoric acid. A sample recently analyzed at our State Laboratory shows 35.45 per cent water soluble potash.

Of the various saline lake basins of the arid West, the brines of the Searles Basin show the largest amount of dissolved potash salts. The average analysis of brine from Searles Lake, California, shows potassium chloride in the anhydrous residue to the amount of 12.07 per cent. This brine, as pumped from the wells, shows an average soluble salts content of 33.29 per cent. It is stated that the Searles and neighboring basins contain four million tons of soluble potash salts that are commercially available. As our normal consumption of potash salts is over one million tons per year, it can be readily seen that the available potash in these lake basins could only meet our national needs but a short time, even if the high cost of refining of the brines and heavy transportation charges did not deter the exploitation of this field.

By-product potash from Portland cement manufacture is a promising probability through the substitution of finely ground potash feldspar for the clay generally used in the manufacture of this product. It is necessary though, to heat the mixed mass of finely ground limestone and feldspar to a higher temperature than in ordinary cement manufacture. At this temperature (1,400° C.) the potash is driven out by the lime and converted into carbonate. This potassium carbonate, being readily soluble, is easily refined and yields by this process a salt containing 65 per cent potash.

Other sources of by-product potash that may be of commercial value are the cane sugar molasses residues after fermentation for the recovery of alcohol, also the waste liquors from the manufacture of beet sugar, and the by-product potash from wool scourings.

The recovery of potash as carbonate from raw wool in the washing and combing in preparation for weaving, amounts

to fully a third of the weight of the raw wool.

We are all perfectly familiar with the value of wood ashes, the first known source for potash. Unleached ashes are valuable, but I am sorry to state, that today it is almost impossible to purchase unleached ashes in quantities.

It is stated that if 150 of the German potash mines were shut down, that the remaining 40 worked mines, could readily supply the world's annual demand of some twelve million tons of potash salts.

It is also stated by good authority, that in normal times, the Kali Syndicate can at a profit mine, refine and deliver at our seaboard high grade muriate of potash at $8.00 per ton.

These being known facts, is it any wonder that American capital is afraid to support native potash projects, as we well know that this war cannot go on forever.

L. T. Dade, Ft. Pierce

Mr. President, Ladies and Gentlemen:

In presenting this paper on fertilizers I am afraid you will be disappointed, as I feel that in handling such an important subject one should be very careful as to statements and advice given, especially at this time, when the fertilizer question is of such vital importance. However, as your committee has seen fit to put me on this program, I will endeavor to do my best and add my mite to this all important question, which is of such interest to the agricultural and horticultural industry of the country at large and our sunny Florida. With such a diversity of climate, soils, and weather conditions it requires a great deal of thought and consideration. But as an exchange of ideas and experiences are a great aid towards success I will endeavor to contribute some information on this subject. As before stated, the fertilizer question is an important one at all times and just now, with potash, nitrate of soda, and other materials at what we might term prohibitive prices it seems as though the farmer and fruit grower would be compelled to quit and go out of business; but the people who make up our farmers and fruit growers are made of pretty good stuff, and notwithstanding the losses of one season are up and ready for the fight when another comes around. As I previously stated, the prices for the principal ingredients composing our fertilizers, owing as we all know to the war in Europe, having greatly advanced and potash almost unobtainable, the question arose as to what we should do. The majority of fruit growers and truckers were of the opinion that it was hardly worth while to attempt to grow a crop without the usual amount of potash. And in some cases where they had muck land they did not plant; others concluded they had best take what they could get and do the best they could with it. And I think that a great many have been agreeably disappointed at the results obtained.

Many of our growers seem to think we could not get too much potash, while others thought we could get along with less; a prominent grower told me he had, this season, grown as fine a crop of tomatoes as he ever saw and the quality as good; and that with but a small per cent of pot-

ash. It is a well established fact that the majority of our Florida soils are, generally speaking, deficient in potash as well as in nitrogen. This I think is especially the case in our high rolling pine lands; on the other hand, our heavy hammock lands seem better supplied with both potash and nitrogen, which fact I think is clearly demonstrated by the heavy growth of oak, hickory, sweet gum and other hard woods found growing upon them. In fact this class of land seems to be pretty well supplied with all the necessary elements that go towards the making of a healthy tree or plant. But with a few years' cultivation and cropping even these lands become deficient in certain properties, so, as our pine lands are deficient in all the necessary elements and our richer lands become depleted the question arises, "How can we build up in the one case and restore in the other, their fertility?" The question has often been asked me, "Can soil be built up with commercial fertilizers?" My reply is, they can by their use and in connection with cover crops, such as cow peas, beggar weed and velvet beans. Without commercial fertilizers and these cover crops, I fear the majority of our best groves would make but a poor showing, and would be of little value. But with commercial fertilizer so high, the question arises, "What are we to do?" Commercial fertilizers, we will have to have, but there are other things which I think will be of great assistance in helping us. The principal one of these is lime. I think that liberal applications of lime will greatly assist us in our horticultural and agricultural pursuits. Lime, as we all know, must not be classed as a fertilizer. It is an agent by which elements in the soil lying dormant may be released and made available as plant food.

It has been demonstrated by experiments that lime acts on and releases not only the nitrogen but also the potash when present in the soil. Quoting from Encyclopedia Britanica, it says, "Lime is essential for the production of healthy crops; experience has shown, that when soil is deficient in lime, farm yard manure, Peruvian guano, and other manures though used in abundance produce but little effect; again on poor sandy soils lime, marl and chalk not infrequently produce better crops than barn-yard or artificial manures. Lime not only supplies an essential constituent, but also prevents loss by drainage of fertilizing matters, such as potash, ammonia and phosphoric acid. One of the functions of lime in the soil is to combine with the acids of the potash and ammoniacal salts of guano and the farm-yard and other manures. And to liberate potash and ammonia which are retained in the land, while the inexpensive lime salts pass into the land drainage."

Thus you see, nature has placed at our very doors an unlimited supply of material to aid us in helping ourselves, in the shell mound and limestone deposits of our State. Then look at our muck lands; thousands of acres of which are found all over the State. Here, too, nature has been lavish in storing nitrogen in the immense deposits of decayed vegetation which by the liberal applications of lime may be made available. In other sections of the State are the large deposits of rock phosphate, which only await treatment with sulphuric acid to give us another of

the principal elements in plant food; and some are even using the finely ground raw phosphate rock. But it still remains to be seen whether this will bring the results desired. It seems as though the old adage, "It's an ill wind that blows no good," may become a truth in this case. Material now lying dormant in our lands may be developed where before we did not realize that we had them. In our high pine and scrub land we may have to be more careful in the use of lime, especially where these lands may be deficient in humus.

But by growing cover crops of cow peas, velvet beans and beggar weed and working them into the soil, lime, I think, will give good results even on these light soils. In groves where heavy crops of crab grass and beggar weed have been turned in, I have gotten good results, using as much as four and one-half tons of lime rock to the acre. In making heavy applications I do not think it wise to apply too often, say every three or four years. Quoting again from Encyclopedia Britanica, it says: "Besides manure of animal and vegetable origin various mineral substances are used; the most important and extensively used of these is lime. In the drier parts of England it is not held in such esteem, whereas in the western and northern countries and in Scotland its use is considered indispensable to good farming. Experienced farmers considered it desirable to lime their land every twelve years at the rate of 120 to 200 bushels of unslacked lime per acre. It is found especially beneficial in the reclaiming of moory and boggy lands, on which neither green nor grain crops will thrive, until it has been applied to them. Its use is found to improve quality of grain and to cause it in some cases to ripen earlier. It facilitates the cleaning of land, certain weeds disappearing altogether for a time, after a dressing of lime. The practice is still frequent, of tenants, at the beginning of a nineteen-year lease, liming their whole farm at a cost of from three to five pounds per acre (this would be about $15.00 to $25.00 in our money), proving conclusively the high estimation in which lime is held. The belief (in which I fully concur), is, however, gaining ground that moderate and frequent applications are preferable to these heavy applications of lengthened intervals." But we must not lose sight of the fact that while lime is a great aid to us we must use fertilizer in connection with it; and in using them, especially commercial fertilizer, we should study the needs of the crops to be grown and select the materials with an eye to their needs. For instance, in growing a truck crop, we should endeavor to combine materials of a quick acting and of an intermediate nature, such as nitrate of soda and cotton seed meal. While for citrus and field crops, we should use nitrate of soda, tobacco stems and bone. These combinations being governed by the materials used.

And now a few words in regard to the application of fertilizer. In many cases the grower does not seem to take into consideration either the crop he is growing or the way in which it is applied. He seems to think that just so it is fertilizer and he gets it on the ground, nature will do the rest. In applying fertilizers we should endeavor to have weather conditions about right; if it is dry at time

fertilizing should begin, put it off until you get moisture enough to wet your land, unless you are provided with an irrigating system. In this case I would say, apply your fertilizer and then irrigate; not too much, however, but just enough to get the ground well soaked, so as to start the action of the fertilizer and promote plant growth. Many growers simply scatter the fertilizer on the ground and depend on the rain to wash it in. This, I believe to be a wasteful practice, especially where organic fertilizers are used. As is often the case, when we get a light shower, it simply moistens the fertilizer sufficiently to start the nitrogen contained and the hot sun coming out causes it to evaporate. And thus we lose one of the principal elements of plant growth. If inorganic fertilizers are used, of course this does not occur. I am a strong believer in working the fertilizer into the soil (be it organic or inorganic), where nature, it seems to me, intended it to go. However, there are some lands and crops where it seems impossible to work it in; in these cases we have to do the best we can and let nature do the rest.

Mr. Hume: It is my pleasure to introduce to the members of this Horticultural Society, who live somewhere else than in Arcadia, a citizen of Arcadia. This citzen of Arcadia wanted to beg off this committee because he said he did not know much about fertilizers, but I would not let him, because I believe every member of this Horticultural Society should know Mr. Ed. Scott. I did not see how you would have the opportunity to know him except in this way. He is the chairman of the Florida Road Commission, and if every one of us is not interested in good roads, then I have nothing more to say than just that.

Mr. E. Scott, Arcadia.

Mr. President, Ladies and Gentlemen:

I have been attending the meetings of the Florida State Horticultural Society for a number of years, just as a member of the Society and interested in the movement. When it fell to Arcadia's lot to entertain the Society at this time, I learned something of the reason for the remarkable vitality of the organization which has gone through so many years of useful work. We found that its officers were wonderful in making their sweet will the pleasure of its host in every particular. It has not been an arduous task to meet these requirements, but we have found every requirement had to be met to the dot.

Then, personally, I have found that the custom which seems to have prevailed is that every member of a committe is expected to prepare a paper upon the subject. When I saw my name on the committee on fertilizers, that never occurred to me at all.

I knew the able chairman of our committee was fully competent, as he has demonstrated, to give you practically all the facts there are in connection with fertilizer at the present time and at any time, so at the last moment I consented to just

come out here and say a few words and then sit down, because it would be an imposition upon this audience to undertake to discuss the fertilizer manufacturing question, when these big manufacturing plants admit that they are not able to cope with the situation created by this hopeless war which has cut us off from the supply of potash. We can only hope that when this old world does wake up and start rebuilding the devastation caused by this war, that the lessons we have learned and the efficiency we have gained will prevent the occurrence of any such situation again.

I do not know anything about commercial fertilizers, but I do know that every horticulturist in Florida has one of the greatest sources of fertilizer at his hand in the product obtainable by going into diversified stock raising. We have a greater variety of forage plants, leguminous plants, which produce the highest elements of fertilizers, and I want to say that, contrary to the opinion of a great many of our people, those products can be preserved here as well as anywhere. The farmer who will just follow this for a few moments, or the horticulturist, will catch the idea I want to convey.

Say you have on your little farm, two or three cows. Nearly every farmer wastes, and every orange grower wastes during the year, enough to feed those cows and make them a profitable investment. A cow, to be profitable, of course, must be well fed.

By preserving your forage in ensilage, these cattle can be grown with the minimum cost. They should be kept in sheds properly constructed. Bedding these sheds with leaves or something to hold the fertilizer, something that will decompose and form the humus so necessary to the soil, every farmer has in his hands the power to supply the fertilizer needed on his grove or farm to a considerable degree.

It is true also that goats, sheep, hogs, chickens, all of these are great sources for the production of fertilizer.

I hope to see our State do more to bring about this diversified stock raising. I think diversified farming is better than going into a great quantity of one thing. As I have sat here and listened to the able speakers who have stood on this platform, I have realized there are men in the Florida State Horticultural Society big enough to tackle any problem under the face of the sun.

This fertilizer problem is going to be solved some day by some of these men.

There is one other phase of the fertilizer subject, and that is the matter of the utilization of the waste of sewerage of our cities. That can be, and should be made useful to enrich our soil, and I bequeath that problem to be solved by our succeeding committees.

Thank you.

Mr. Hume: Yesterday I found a stranger in our midst and this Society is always glad to welcome a stranger, and yet the gentleman I am going to introduce to you is no stranger, because he has been engaged in agricultural work in this country for many years. I am going to introduce to you now, Doctor J. H. Wheeler, formerly director of the Rhode Island Experiment Station. He is going to say a few words.

Dr. J. H. Wheeler.

I am unfortunate in having left my voice in the middle west, where I was lecturing for a while. I wish I had only a part of it so that I could make you hear.

I think this is a case of being a stranger and being taken in, because I had no idea I would be called upon to speak. I came as a listener, because I know the valuable work your Society is doing, and after arriving here I was asked to speak on a few topics.

Your State is not a stranger to me. I don't know but that I am the person referred to by Mr. Lynch tonight, because I was in Arcadia a few days ago and I went back to the next place to heaven, which is New England—and here I am back again.

I say Florida is not a stranger to me. For many years the director of your station was one of my beloved and respected colleagues in the work of agricultural experimentations, and I want to tell you, if you do not know it, already, that he is one of the leading men of horticulture in the entire United States, and you have every reason to be proud of him, and I hope you will keep him for a long, long time. (Applause.)

It was my pleasure about the middle of February, to visit your State University and Experiment Station, and I want to congratulate the people of Florida upon the far-sighted vision in bringing together those institutions and establishing an institution that is laid out in a magnificent and comprehensive way. It reflects the greatest credit upon the vision of your State. You have been building wisely and well, and generations to come will thank you for it.

I have known your genial State Chemist for many years and had the pleasure of meeting his better half upon previous occasions, so that I do not come to Florida as a stranger.

The first thing I was asked to speak to you about, was feldspar. You may remember a few years ago, a bulletin was published calling attention to ground feldspar, and some things were suggested which might lead you to think it might be valuable. We began to have letters asking if it would not be possible to grind up the feldspar rocks. If that was the condition brought about by the bulletin of the Department of Agriculture, it was time something was done about it. So two men devoted a part of two years to that work, and they found no benefit obtained by the use of this feldspar when ground so fine it would pass through a mesh, two hundred meshes to the lineal inch. Shortly after, I was at Washington, when an authority on the subject remarked that he had read the bulletin from Rhode Island with great interest and that they were getting results that seemed to agree with ours, and it was time definite statements were made, as the first bulletin had led to the belief that finely ground feldspar was valuable as a manure.

Now a word as to raw rock phosphate. That is another one of the delusive hopes that the farmers of this country have hugged too fondly.

I heard a speaker from the middle west say the Ohio and the Pennsylvania authorities held that raw rock phosphate was an organic fertilizer. I wrote to the experi-

ment stations of those states, and in a communication received from the director of the Ohio station, he says that while they formerly thought that raw rock phosphate would be more organic than the superphosphate, the reverse has proved to be true, and the only place where they now recommend the use of raw phosphate is in open yards.

I took it up with the Pennsylvania station, and he said if I used the raw rock phosphate as against superphosphate, if the results were favorable to the former, it would be counter to their data.

And those were the two states supposed to represent the raw phosphate propaganda.

I have been asked to say a word about lime.

I do not know whether you know it or not, I have experimented with over six hundred plants; I presume more experiments have been made in the Rhode Island Experiment Station than in all the rest of the ——— put together.

Beets, lettuce, spinach and cress are most in need of lime. Cauliflower and those related plants follow along behind. You can make a soil so acid that not a single beet nor lettuce plant can be produced, and you can grow some plants there better than on a soil not so acid. It can be made so that you can not grow a clover plant, and other plants would thank you for the acidity.

That is true of agricultural plants. If I had time I would tell you about them. There have been men from the middle west who came into Indiana and told us we ground our limestone too finely; that the size of peas and beans would be all right. Others contend that it should be ground very fine indeed, so that most of it will pass a sieve having sixty meshes to the lineal inch.

It is better to make small applications on your sandy soils and make them more frequently. There are dangers connected with over-liming sandy soils. You take a soil containing magnesia and put on too much lime, and you create a wrong condition. On the other hand, where there is too much magnesia, if the lime is deficient, a condition that is harmful is created.

It has been shown in Porto Rico recently that the sandy soil is fraught with danger when too much lime is used. The condition of the plants was corrected by spraying iron over them, which was absorbed into the plant.

I believe when we come to study the question seriously of liming or not liming, we will find that the diseases of plants have far more to do with this question than we know at the present time.

Just one more thing. Does acid phosphate make soils acid? Is it true, or not? Indiana Experiment Station asserts that they have tested that matter, and their conclusions are that acid phosphate does not make the soils more acid, but actually makes it less so. That assertion has been verified by the Massachusetts Agricultural Experiment Station, which states that the soils that receive the acid phosphate have become less acid with time.

I wrote to Prof. Haight the other day and asked if that was the result of his own experiment work. He gave me the results of the experiments in West Virginia, which are in line with those I have quoted.

There are lots more agricultural idols

I would like to break if I had time, but I haven't.

I want to say that I am very glad to look into the faces of this Florida audience. I have said, and I say it because I mean it, not to flatter you, that you can go into any part of the country you please and you will not find a more intelligent and more progressive line of men engaged in agriculture than in your state, and when I went home from here last February, I stated there were needed only the elimination of two things—the citrus canker and the cattle tick—to make Florida a little Paradise. (Applause.)

Orchard Heating

GROVE HEATING

Rolland E. Stevens, Daytona

The subject of grove heating is not new in this State by any means. About as soon as there were citrus groves and pineapple plantations, there were attempts to keep off destructive freezes and frosts. These efforts were first with wood as fuel, and later with rosin, and many theories were advanced regarding the beneficial effect of smoke or smudges, which brought on the use of damp straw and leaves and manure, which would burn slowly and give off a dense smoke. Coal has never been very extensively used in this State on account of the prohibitive price, and it is being replaced as a fuel in many sections where it was formerly used, by the oil-burning, pressed-steel, smudge pot or orchard heater.

There are many types of heaters on the market, all of which claim certain distinct advantages for themselves, either in the matter of price, freedom from complications in handling, oil capacity, or length of burning. I do not believe there is any heater on the market, which embodies all the good points in one heater.

In California the greatest advances have been made in orchard heating. Some of the most prominent men in the State devoted their time and study to the matter, and as a result we have a few types of heaters which stand out above all others in efficiency.

There are many points to consider before selecting an equipment of heaters. These depend upon the minimum temperature to be encountered, and the duration of the cold waves. Also the length of time necessary to obtain a new supply of fuel. In our own case, we carry on hand enough fuel to burn five days, as we figure that four days would be ample time to replenish our supply from the oil companies.

The matter of size in heaters will depend principally upon the minimum temperature encountered. If the temperature never gets more than five degrees below the danger point, and then only for a few hours, a small heater is as effective as a larger one; but if there has ever been a time when the temperature was below the danger point all night, a heater that will burn six hours will have to be refilled during the night, an operation which is extremely undesirable.

We find it desirable also to put in more heaters per acre than the manufacturers recommend. It is much more satisfactory to have a large number of heaters burning half capacity than half the number burning full capacity. It dis-

tributes the heat more thoroughly through the grove, and insures you against burning out your fuel before it is most needed, which is generally just about daylight. I am using about 75 heaters to the acre, where the makers recommend 50. In California they use one heater per tree. I am using one heater per tree for about six rows on the north and west sides of the grove, because all our cold comes from the northwest. It is also advisable to start lighting on the north and west sides. (On West Coast the cold comes from north and northeast.)

In regard to the cost of installation, this will vary according to the size of the heater selected, ranging from about 50c apiece to $1.25 or $1.50 each. The last 9-gallon heaters bought cost us $1.17 each delivered at the grove, but I understand the price of these has been raised, due, the makers claim, to a rise in the price of raw materials.

Since putting in these 9-gallon heaters, it has not been necessary to fire, so I cannot give any experience with the actual operation of this type of heater; though I am convinced that we can raise the temperature in our groves 20 degrees, which is absolutely safe so far as any temperatures are concerned that have ever been recorded here.

There are some heaters recommended which claim to be smokeless. As a matter of fact they are not smokeless, but are comparatively sootless. Some of the growers in California at one time fired continuously for 17 days. At the end of that time, the trees and fruit were pretty thoroughly coated with black soot, and an immense amount of damage was done to furnishings and decorations in the residences in the groves. This fact brought out the so-called smokeless heater. It does burn most of the carbon, and does away with practically all of the soot. However, it has a tall stack, from three to four feet tall, and it is claimed by other manufacturers that a large percentage of the heat is discharged high up from the ground, where it gets away into the upper air without benefiting the air near the ground where it is most needed. I am not prepared to say, however, that this assertion is correct.

I have never had any trouble with soot forming on fruit, even with the old type, resevoir heater, which makes no pretense of burning the soot; and the fact that the grove is filled with black smoke, no doubt, will keep the sun off when it first comes up and allow fruit or blossoms which may have been frosted to thaw out slowly, which is in time a desirable feature.

If small heaters are installed, it is desirable to have a supply of oil distributed in comparatively small tanks through the grove, where the heaters may be refilled quickly by a large force of men with buckets. If heaters are large enough to insure carrying through the longest cold spell without refilling, it will be much more economical to have one or more large tanks, preferably made of concrete, so that the heaters may be filled from tank wagons driven through the grove. I can recommend concrete in spite of the fact that I understand some growers who have put in concrete reservoirs have found them unsatisfactory. We have one of these reservoirs which has been in six years, and it is absolutely oil tight. If concrete is properly made and coated on

the inside with hot tar, it will hold oil. A steel tank is very apt to prove a tempting target for a hunter, and if it is not noticed very soon a large amount of oil will be lost through a 22 caliber hole.

As to the proper time to light heaters, there are many points to consider. It is well to study the weather from the weather map, with the aid of a barometer and a wet and dry bulb thermometer. If the atmosphere is dry, due to a long-continued northwest wind and no rain or dew, the fruit will stand several degrees lower temperature than if it is heavily laden with moisture. I have allowed the thermometer to go to 26 with no apparent damage to fruit or foliage. At other times, if it goes to 28 for a very short time, we have lost a good many leaves, some new growth, and considerable fruit, in sections of the grove where we were not prepared to fire. The firing point must be determined every time, and if it is decided that 28 is the time to fire, it is well to have men with torches all lighted before the thermometer gets to 28. It is much easier to hold the temperature from going down, than it is to raise it after it has gone down, as the heat in the ground and trees and fruit radiates rapidly, and picks up heat very slowly.

Much will depend, too, on the rapidity with which the thermometer is dropping; also the time of night at which it is going down. If it is 40 at 9 or 10 o'clock at night and going down one degree an hour, it is not nearly as apt to get to the danger point in time to stay there long before sunrise, as if it is 32 at 9 or 10 o'clock. When first lighting up, if the thermometer is only going down slowly, it is well to light every other heater, and then note results on a thermometer hung four or five feet above the ground as far away from a heater as possible.

It is well to have one good thermometer to at least ten acres of grove. When you get a thermometer, don't merely go to a store and ask for a good thermometer. Get one which has been tested by comparison with a thoroughly reliable thermometer. I have seen a dozen thermometers in a hardware store, no two of which showed the same temperature in the show case, and with a difference of ten degrees between the highest and the lowest. When you have the fate of your whole orange crop depending on the reading of a thermometer, it is pretty good economy to have a good one; and I don't mean necessarily an expensive one, but a thoroughly reliable, guaranteed thermometer, which the makers guarantee to be accurate from ½ to 1°, which may be had for $1.00 each.

Water in a shallow metal pan is a good check on the freezing point.

I fired ten acres with 75 of the old type, reservoir heaters to the acre and in three-quarters of an hour raised the temperature ten degrees. I had the men shut off half the heaters, and still held the temperature five degrees above the minimum in a section outside the heated area.

There has been much discussion of the heating problem. When this Society met in Palatka, I had the pleasure of addressing you on this subject. I understand the committee which had this in charge last year reported rather unfavorably. I am not in a position to state that it will be a success under all conditions, but I am

just as sure that I can save my fruit and trees, situated as we are in a heavy hammock with windbreaks of virgin timber on all the north and west sides of our groves, as I am that it is advisable to carry fire insurance on the packing house. Of course, if there is no cold weather and no cause for firing, it seems like an expensive luxury to have several thousand dollars tied up in a heating equipment; but should there come a season when the thermometer goes to 20 or even 15, that will be the time for the man who is equipped to save his fruit and trees, to realize on his investment.

Mr. D. C. Skinner has very kindly brought several makes of heaters here for your examination. They are the latest development in this line, and each has its own distinctive qualifications. I do not feel that this committee should recommend any special make of heater, and I do not claim that one has any distinctive advantages over the other. I do think, however, that in my own instance the heater of large capacity, say from 7 to 10 gallons, is the most desirable. I believe they will last from 6 to 8 years, if properly taken care of. We find it advisable to dip them in either oil or asphaltam paint before setting them away, and if they have been fired, it will be advisable to go over them and repaint them, as the paint will, of course, burn off.

In regard to the fuel to be used in these heaters, that is something I cannot recommend offhand. It will be necessary to get a grade of oil which will flow readily in cold weather, and which will ignite quickly when primed with a little gasoline. Avoid an oil which is too heavy, and which contains asphalt. We use a lighting torch similar to a large oil can, with a capacity of one gallon. This has an asbestos and a wire screen in the spout to avoid any danger of an explosion, and we use a mixture of about 2-3 gasoline and 1-3 kerosene, pouring a little through the wick and then lighting it; the spout of the can may then be held over the heater and the contents allowed to run on top of the oil, and the fire will follow and ignite the oil.

The California growers use an oil of about 27 or 28 degrees gravity, and pay about 3c per gallon for it delivered at the grove. It was one or two cents per gallon higher here, and is probably a little more now since the recent rise in the cost of oil. It is, however, much more easy to handle, the fire is more easily controlled than any of the other fuels, and is rapidly supplanting all others for this type of work.

W. S. Hart, Hawks Park

The first esential to the successful protection of citrus groves from injury by cold is an abundant supply of good fuel, in place by the second week in December, and all ready for lighting up quickly on short notice. The two kinds of fuel that from my experience seem best adapted to this work are wood and crude or so called fuel oil, and a combination of the two is my choice. Where wood is used it should be of some lasting freely burning kind like heart pine, or "lightwood," as it is called in this State. Other woods will answer, if used within a short time after cutting, but as years may go by before weather conditions make it nec-

essary to use it, the less lasting varieties may be of little value when required, and disappointment and loss may follow a dependence upon them. Wood for this use seems to be in shape to bring best results when cut in four-foot lengths and split rather coarse. In placing the wood ready for lighting, a solid stick should be laid at the northwest side of each tree and far enough away so that injury to the foliage will be avoided; though this is not as far as most people would suppose. This stick should point N. E. and S. W., two sticks laid in the form of a "V" with the closed end pointing towards the trunk of the tree, and meeting on top of the middle of the first stick, will keep the fire mostly at the point of juncture and save needless waste of fuel.

In the angle formed by the last two sticks, lay several sticks of kindling of fat pine and under these a dry palmetto leaf. If a lump of rosin battin half the size of a man's fist is laid on top of this, it will insure the lighting of the pile quickly and effectively. Have handy a good supply of wood to replenish the fire whenever needed, or supply new piles, if a second or third night of cold follows the first, so that much energy and time may not be required from tired hands after a night of sleeplessness, before taking up the work the next night.

In the use of wood about one man to the acre is required at each burning. The help for this work should be engaged beforehand and some one who has a real interest in the results should be on hand to see that the fires are not neglected or needlessly large fires kept up that would involve a waste of fuel.

A reliable thermometer should be placed in an exposed place to windward, and well out of range of the heat from the fires, and visited often to show what temperatures are recorded outside. Inside the groves, and at points least affected by the fires, more thermometers should be placed to show what results are being obtained there.

In starting the fires it may be well to light every other pile in every other row, note the effect and add new fires as rapidly as required to keep the thermometer above the danger point only.

When wood and oil are both used I advise a good line of wood fires on the north and west of the grove, one to each tree, and oil fires throughout the rest of the grove.

If the air is warmed as it comes into the grove it is easy to keep it so until it passes beyond the area to be protected.

The line of wood on the edges of the grove can be built up as required and in addition to the heat, will furnish a blanket of smoke to flow over the grove that helps to shut off radiation above and keep the heat where it will be most effective.

In the morning, as the wood is scattered that the fires may go out, this smoke cloud is increased and the bed of coals will still throw off heat for a considerable time. If the sun comes up clear, this smoke will help materially in saving any fruit that may have been frosted by protecting it from too rapid thawing. Even a frozen orange, if thawed slowly enough so that the cells may recover the water forced out of them by the cold, will still be good and marketable and even sweeter than before, while if warmed quickly, they would be worthless.

There are several kinds of oil pots in

use, and the best of these may be regulated as to the amount of blaze produced, according to the requirements of the weather conditions. Most of these are good. Much is claimed for the down draft pots, but I have had no experience with these. I have used the old, round conical pots, but have discarded them as too small, and because the heat grows less as the oil burns out, with no way of increasing it except by refilling every little while.

The pots with parallel sides and sliding covers can be regulated as required until the whole surface of oil is ablaze, and the latter makes hold enough to allow their burning for twelve hours, or more, thus making it unnecessary to replenish during the night. When these are used, one man can attend the pots on four or five acres very nicely, though in lighting, rapid work can best be done by two men, one opening up the pots and the other carrying a safety torch from which he pours a spoonful or two of burning oil, gasoline and kerosene mixed, into each pot which ignites the heavier oil very quickly. With this arrangement the pots may be fired almost as rapidly as one can walk along the line of pots.

A very important matter is to see that there is no water in the pots, otherwise when the water is heated to the boiling point, it will cause the oil to foam over, spread on the ground, and not only waste the oil, but injure the soil and make a great blaze that may seriously scorch the limbs above it. A little water will go a long way in this harmful work, so it pays to be very careful about keeping the oil free from it.

In drawing oil from the car tank, quite a little water is usually first to come, if drawn from the bottom. The storage tanks, if left uncovered, may accumulate considerable rain water and the pots when filled in the grove may have the covers so adjusted as to allow water to enter at one end or the other, if they are not properly adjusted. If not well closed rain will enter, and many pots are so made that if the cover is closed too tightly, rain falling on the covers will run to the other end and enter the pot at the corner causing the oil to overflow as the water contained increases. This last is a serious fault in construction and one that may not be noticed in time to prevent serious harm from being done. Watch out for it very carefully.

The greater part of my protection has been by the use of pine and mangrove wood and I have saved several thousands of dollars worth of oranges when those on neighboring groves were ruined and the trees injured by the use of this fuel and at an expense that left a very wide margin of profit.

Some of my neighbors used to declare that rather than go to this expense and trouble they would go out of the business but after watching the work and noting results, nearly all have now come to adopt this means of protection and feel well paid for doing so. In fact they mostly fire their groves in many instances when I consider it unnecessary to do so.

When my trees are dormant and the fruit still on them I start my fires at 27 degrees above zero, if mercury is still going down. If this degree of cold is reached just at daylight, and mercury goes no lower, I do not light up.

This year I fired for six hours, starting

when the thermometer registers 28 as, at the time, there was much tender growth on the trees and they were nearly in full bloom.

Noting the results of the cold in groves on like elevations, I am not sure that this was profitable but I feared a considerable drop of mercury at about daylight, and in fact, it did drop to 26 for a short time but did little harm.

Years ago my groves, when in full bloom, went through a short spell with mercury at 24 degrees and still I lost not over one-third of my bloom and the fruit crop was heavy for that year.

The impression left by the report of this standing committee last year was that those then composing it, saw little or no benefit in any efforts at protection, and therefore did not recommend any of the devices and methods now in use.. I know that this is an error and can only account for such a report by thinking that wrong methods were practiced by them and their informants. I know that my outside investments would now be aproximately twenty thousand dollars less than they are if I had not practiced grove protection since the great freeze-out of 1899.

In the annual report of this society for 1905 (page 109.) will be found a more complete article from my pen on this same subject. It might be of sufficient interest to be worth looking up.

Vegetable Growing

CABBAGES, KINGS AND PRESIDENTS

Eugene L. Pearce, Clearwater, Fla.

Mr. Hume: You know it is almost an impossible thing to get a man to serve on the vegetable committee. But Mr. Pearce is here and has prepared a paper. It will be read for him.

Mr. President, Ladies and Gentlemen:

When the distinguished president of the Florida State Horticultural Society advised me of my appointment as chairman of the Vegetable Committee, he said in effect: "You are forthwith commanded to assemble and produce data touching the vegetable kingdom, same being my principality west of Longitude 49. In this my behest, fail not."

The above is not the precise language of the communication. It provides you, however, with an idea.

Approaching the point of fact by degrees, the writer of this able research received the command of higher authority with the best grace possible, merely advising the president by return courier that your vegetable chairman knew little of the vegetable kingdom, the citrus family being a possible exception; nevertheless he was prepared to offer words of experience and wisdom if it should become necessary.

A list of fellow researchers had been provided, and after the President had denied audience to the above protest, it seemed the better part of prudence to investigate this committee of associated misery.

The first gentleman of the committee to be approached replied that such things as vegetables stood around in his part of the country. He had seen them there and on occasion had eaten them. He had a personal disinclination toward considering them in measured language, rhyme or metre, greatly preferring to discourse on the general merits of the noble swine.

Committeeman Number Two advised your vegetable chairman that he had been growing oranges for seventy-five years, grapefruit for forty-five years—and what was a vegetable?

The third of my fellow-victims said he had analyzed, discussed, produced and devoured vegetables and vegetable reports until he hadn't the heart to look a vegetable in the face; nevertheless, if pressed into service, he would provide something similar to last year's paper for the society. Ev-

idencing marked personal sacrifice, he offered a carbon copy of said paper.

The chairman of your Vegetable Committee was in despair. He hurriedly dispatched another courier to the president, representing the desperate state of affairs relative to the vegetable kingdom. The future destiny of the beet and the onion lay heavy on this committee, and your chairman felt the responsibility.

But His Excellency answered never a word.

There is psychology or something else in silence. When His Excellency failed a second time to remark, your chairman of vegetable research began to fidget. Certainly something had to be done. Once more the chairman in charge of the vegetable kingdom sent a courier to Authority. This time more specific representations were made; namely, that the chairman of this Vegetable Committee was Hors de Ignoramus; that by nice differentiation he could distinguish between the succulent cauliflower and the juicy roasting ear; that stormy, peerless Pinellas was not regarded as the home of the string bean or the cuque vine; that our specialties were grapefruit, pepper, bond issues, brick roads, politicians, real estaters and climate; that our 165 square miles of breeze-swept piny, our eighty miles of salt shore-line, bounded the happy hunting ground of the Brick Trust and the Tampa Bar Association; that the ninth vice-president of the Georgia Engineering Company was the sixth county commissioner of stormy, unbeaten, peerless Pinellas; that we were the American Balkans, with the mountains wiped off after the last eruption.

All this and more I said—in effect. His Excellency said nothing.

This continued silence coupled with the gravity of the situation brought on an attack of "nerves." Something *had* to be done. The chairman of your Vegetable-kingdom-special-research Committee by great good fortune had heard of a citizen who along about '83 had grown a crop of cabbages. Jumping into a twin-six standing at the curb, provided by the city of Clearwater for the use of all citizens who do not care to walk (under bond issue, coupled with hotel and waterworks appropriation), I glided out over the brick boulevards to the home of Uncle Milt Samuels.

Uncle Milt verified the rumor that he had once grown a crop of cabbages. He would be very glad, he said, to assist me in any way he could. He was running for county commissioner that afternoon, double-crossing the Petersburg bunch on the ninety-third phase of the court house tangle, and trying to steal some territory from the next commissioner's district—but he guessed he could take off a little time for a pressing matter like this cabbage trouble.

I told him I wanted to know all there was to know, as Luther Burbank was quite ill, and on this committee might shortly devolve the responsibility of administering high justice, the middle and the low in the vegetable kingdom.

Uncle Milt was able to appreciate the urgency and he hastened to relieve the situation.

"In the first place," he remarked, "select ground rich enough for cabbages, but not too rich. Drain it properly. If you

see that the drainage is working too well, stop it some way."

Other instructions followed. It would seem that you ought to have an irrigation plant. Give the cabbages all the water they can possibly use, but if you observe that they have had sufficient, it is time to discontinue.

Plant fairly close. The closer you plant, the more cabbages you will have—if all live and prosper. On the contrary, if cabbages are planted farther apart, there will not be so many as a usual thing, though perhaps they will grow larger.

Put on considerable fertilizer, but not too much. Buy from reliable manufacturers—any of the thirty or forty best known manufacturers doing business in Florida. Take whatever they recommend. They can prescribe for your land without seeing it.

Should any manufacturing concern send a small army to see you—the local agent, the state agent, the tree expert and the special specialist—be sure to buy enough fertilizer to reimburse the company for staging this light drama; otherwise you drive a worthy corporation out of business.

Plant to have your cabbages mature in January, as the best market is usually about that time. If that time proves to be unfortunate, wish again.

The medium-sized heads usually bring the best price by the barrel. On the contrary, large heads usually fill more barrels. However, this problem may safely be left to personal taste and inclination—the question of sizes.

When your cabbages begin to show character and make head, apply the leaf curler every morning—not too hot. Use only aluminum-lined curlers.

In conclusion, ladies and gentlemen of the Society, I would suggest that the tin cross be awarded this committee for exhaustive research touching the cabbage.

MORAL

There was no alternative but to kill time. We have done what we could in this direction.

S. H. Gaitskill

Somehow as our president says, it is very hard work to get anyone to talk about vegetables. He has hard work to get vegetable men on a Vegetable Committee every year since I have known him. It would seem the vegetable business of Florida is among its best lines of business and I expect, by and large, brings in more money to the average poor man than any other one thing that grows in the State.

It is really an important subject, and a matter of very great importance to the State. I have lived for thirty-two years in a section of the country where vegetables have been grown; not one, but all. It is not what is termed a one-crop country. We have seen nearly all the vegetables that have been marketed grown in our section of the country. We grow good potatoes, good cabbages, beans, peas. Most sections have a specialty and I have seen nearly all of them grown successfully and all of them have made more or less money for the grower.

To make the greatest success, a man

should grow what he loves to grow. He should select two or three or four or five kinds of vegetables and plant them every year whether they make a success each year or not. Don't jump about from one line to another. A man should not stake everything on one crop; be a plunger, as it were. He may make a good deal of money one year or two years or three years if he plants one crop and plants that crop alone, but it will eventually break him. I canont understand why that is, but it is true.

In our section, where we plant four or five different kinds of vegetables, there will be enough of them each year to bring good prices that will bring you a profitable return on all the planting. That is why it should be grown that way.

All men love to grow one crop better than another. And you usually can grow that crop better.

The first thing is to be sure to prepare your ground well; that is of great importance. Plow it deeply, adding humus at every plowing. The lack of humus has been one of the curses of our country. We have burned off the grass and weeds to get them out of the way so that we could plow easily. We have now learned it to be a fact that this grass and weeds should be plowed under. We now use a small tractor and cutaway harrow and plant velvet beans between the rows of the crop and when fall comes there is a rank growth all over the land. We take a cutaway harrow and run it over them with a small tractor—you can't do much with mules and horses, they get too tired. But by using the tractor and harrow you can soon cut this growth. It soon dies and then it is turned under. This cuts out fertilizer bills in half, just this plowing under the humus crop.

Another mistake is planting too large an acreage. It is the reasonable acreage that makes money for you. Going on too large a scale you are sure to "fall down."

When you cultivate, after preparing the ground, cultivate often and shallow.

Another great trouble is gathering our crops before they are ready. That has been a great mistake we have made. Get the vegetables first in proper condition, pack them, and leave the culls at home. The biggest profit is made when you leave those culls out. We are all exactly alike; we always grade a package by the meanest piece there is in it. If it is not packed right, we don't want it any more. We put culls in our boxes and expect men to pay us for them and keep right on buying them. We will do it; why, I don't understand. We must make the inside as good as the label we put on it, or what is the use of putting anything on it at all? In our orange packing, and I believe Mr. Hart will carry me out, we have never yet reached the point where we made our orange boxes full of oranges of the kind the label on the outside said ought to be there. When the purchaser opens that box and finds what kind of fruit there is, he is not going to want that kind of brand any more. If the label on the outside of your box says, "The best oranges in the world," see that they really are the best oranges in the world; you can do it, for Florida can raise them.

In Kentucky they do the same thing with tobacco; you will find good tobacco

packed on the outside and poor tobacco in the center.

Mr. Tenney insists that brighter and better fruit is all right, but I think an honest package is worth more than bright fruit. I have sold russet fruit at as good a price as brights, but I called them russets on the outside. The man who bought them knew what he was buying.

For the meat of our report, we depend on Mr. McQuarrie, for we know he is thoroughly competent.

VEGETABLE GROWING IN FLORIDA

C. K. McQuarrie, Gainesville

Mr. President, I wish to enter a protest. I have been on this Vegetable Committee three years in succession. That is too much, and I wish you would change me to some other committee.

This is the third time in succession that we have been put on the program of the State Horticultural Society to say something regarding vegetables. This seems to us to be laying it on somewhat strong, and at first glance one would be inclined to think the subject ought to be completely thrashed out by this time, but, seeing your executive committee have, in their wisdom, put us on one more time for the same subject, it is up to us to try to do the best possible along some new lines.

On previous occasions references were made to certain methods observed in the production of vegetables as well as recommendations for improving both yields and quality. Among the points discussed were "Too Small Holdings," "Diversification," "Specialization," "Honesty in Grading and Packing," "Co-operation," "Distribution and Marketing," and a few other essential points. On this occasion we propose to give some attention to methods of maintaining and increasing soil fertility and the bettering of soil conditions generally to the end of being able to steadily increase the yields as the years roll around.

The vegetable growers of the State can be divided into three classes. Class No. 1 belongs to a group that make vegetable growing their chief activity and are in the business to stay, taking risks of weather, market conditions, and crop supply as a matter of course, and some years making a good thing of it, while in other years their luck goes against them, and upon the whole they break about even three years out of five.

In Class No. 2 are included those who make vegetable growing a side issue; who in years when weather conditions are promising in the early part of the season plant quite an acreage to vegetables but who always take care to plant sufficient staple crops to insure themselves against complete truck crop failures.

In class No. 3 can be included the man who occasionally butts in and grows a crop of vegetables of which he knows very

little. If he makes a success of it he drifts later on to the No. 2 class and in about ten per cent of the cases he will, after a few years, find himself in class No. 1.

IMPORTANCE OF THE CROP

We all know the importance of the vegetable crop in Florida. According to the last report of the Commissioner of Agriculture the value of the crop was somewhat in the neighborhood of $14,000,000, being considerably above the figure for the combined fruit crops of the State, and ranking next to the staple crops and live stock. But in the years to come this crop is going to forge steadily ahead and become next to live stock the most important Florida product, as with our long seasons in which to grow vegetables there is no reason why Florida should not be the winter vegetable garden for the entire North American Continent.

FACTORS FOR CONSIDERATION

In the further discussion of this crop there are some factors that we might take into consideration in dealing with crops that can be classified as vegetables. Some of the most important of those are the un-uncertainty of weather, uncertainty of seed, poor results from fertilizers, poor results from irrigation, market fluctuations at the very important period when the crop has got to be moved or allowed to rot on the ground where it grew, and, considering this whole matter in a comprehensive way, a great many factors enter into the successful production of crops of all kinds. Among those we would mention, personal knowledge and ability of the grower himself we would call the main positive factor. Then, on the other hand, there are certain negative factors which will appear in the form of cold snaps, extreme and sudden changes in temperature—either too cold or too hot—plant and soil diseases, insect pests, and most important of all are the natural factors in the soil that determine the condition of plant growth.

Another factor in the work would be the artificial methods of control, in the preparation of the soil before planting the crops, tillage and cultivation of the crops during the growing period, crop rotation, fertilizers—how and when to apply them —also the kind of fertilizers to apply to the different crops to get the best results. In this could also be included good seed, sunny weather, so as to warm up the soil, and cultivation operations so as to increase bacterial life in the best way. The physiological peculiarities of crops under certain conditions, sufficient moisture by either irrigation or early soil preparation.

PROFITS FROM CROPS

I might, as a preliminary to the main idea of the paper, give a glance at the main object in view when a man undertakes to grow crops of any kind, let it be truck, fruit, or any crop. The first object in view is the profit to be derived from the operation. This, while no doubt a very important one, should not overshadow the maintaining of the fertility and sanitary condition of the soil in such a way as

to insure him a continuous profitable crop produced from his land.

AREAS IN USE

In further discussion of this, I would like to say something about the trucker with the small acreage versus the trucker with the large acreage. The man with the small area must conduct his operations on a very intensive plan; something like the celery growers of Sanford, the lettuce growers of Winter Garden, and some other sections of the State where these operations should be classed as intensive farming intensified. The men conducting these operations along intensive methods are, to a large degree, a class by themselves and could hardly be counted as belonging to the rank and file of vegetable growers. They have spent years in learning the *how* of doing these things, and, as a general rule, they operate on comparatively limited holdings, and while their activities are generally confined to one specialized crop, yet they should be the very ones to study and practice along the lines submitted in the following remarks:

MAINTENANCE OF SOIL FERTILITY

One of the main operations we would like to discuss as briefly as possible is the maintenance of soil fertility and sanitation to the end that crops could be profitably grown for a great number of years, on the same land, and to do this the best possible system of crop rotation should be practiced, because without a system of that kind it would be an utter impossibility to maintain the soil in the condition to give the grower profitable returns. It is along this line we want to devote most of the time given to this paper. We might change the title and call it "Twentieth Century Vegetable Growing," because everyone who has studied the possibilities of vegetable production in Florida and has noted with apprehension the slip-shod ways in which eighty per cent of the vegetables are produced must realize that the vegetable grower must conduct his operations along the lines that are going to give him better and more permanent results.

But to strike the real keynote of continuous crop production, we must turn to crop rotation methods, not only to maintain but to increase soil fertility so as to have the soil at all times with a responsive tone that will give us maximum yields of crops at the time most desirable.

MEANING OF CROP ROTATION

The question comes up right there, "What do we mean by crop rotation?" In the older countries of the world where agriculture has been conducted for thousands of years along improved methods, a system of crop rotations gets the most consideration and has been studied out to a far larger degree than any of the American truckers have ever been compelled to study it. In analyzing the meaning of crop rotation, we can put it in a clear way by quoting one of our foremost agriculturists, who says "that crop rotation is a systematic arrangement for

growing different crops successively on the same land."

Now let us follow this idea a little further. The main idea in crop rotation is to utilize the plant food in the soil so as to maintain its physical, chemical, and biological condition so as to enable it to permit and increase crop yields. The particular system of crop rotation to be practiced will have to depend upon the kind of soil and general character of the crops under consideration, and this systematic practice of crop rotation is in direct contrast with the one-crop system where the same kind of crop is grown continuously year after year as is practiced by a good many of our vegetable growers in the State of Florida, and also by a large number of the staple crop farmers, particularly in the cotton sections.

CONTINUOUS GROWING OF SAME CROP

It is a well recognized fact that the continuous growing of one crop year after year makes the soil, sooner or later, show a steady decrease in crop production. This may be due to several causes, such as diminished supply of necessary plant food, making the soil one-sided in its nature, and in a measure impairing its sanitary condition in such a way that it would be impossible to expect large yields of any crop planted on such unsanitary soil.

Some of the advantages of crop rotation are not fully understood, and particularly so by men in the State who do not want to study the problem in Florida where agricultural methods are somewhat in the formative period, and we can readily understand the attitude of the trucker and vegetable grower toward this side of the system of crop rotation. However, we know enough about results obtained by those who practice rotation to state definitely that a rotation system can accomplish great good to the soil and increase the production of crops when effectively conducted.

EFFECT OF CROP ROTATION

Among the principal things that we know crop rotation will do, are the following, which we will discuss in their rotation as they occur:

First, rotation of crops changes certain individual plant food requirements and makes the best use of the remains for the following crops, thus maintaining the necessary soil sanitation, which is so much overlooked. It provides economical supplies of nitrogen, maintains the supply of organic matter in the soil, keeps the soil in good physical condition, keeps the soil busy all the time producing crops to best advantage; prevents, as well as helps to reduce injury caused by poison materials in the soil; controls injuries done by insects, weeds and fungi; saves labor; and what is very important, systematizes methods of crop production.

The changing of the root feeding range in the soil is very important as the root systems of different crops occupy different stratas of the soil. Some crops have deep feeding roots and some shallow feeding roots, thus the different plant foods in the soil are taken by different crops from the different layers as their rotation comes around; so that when a rotation system is practiced the plant food in the soil is

taken from different layers and is less quickly reduced than when the roots are feeding several seasons in succession at the same depth and absorbing certain plant foods at these depths.

In most soils the potash content is usually in the lower soil and nitrogen and phosphoric acid in the upper. As an illustration, some grains get most of their supply from the surface while clovers and other legumes go more deeply. The roots of the cowpea have been known to go to a depth of several feet, thus making it very desirable in a crop rotation.

The demand of crops for the various plant foods can be best met by proper rotations. Some crops use more nitrogen than others, some use more potash, thus the continuation of heavy potash feeders would soon reduce the soil content of potash and even where this element was added in the shape of commercial fertilizer, the soil stratum containing it might not be reached by certain types of plant roots.

The same can be said of all plant foods in the soil. The use of the preceding crop residues to advantage is one of the methods by which soil fertility can be not only maintained but increased by a system of crop rotation.

CROPPING PLANTS

To illustrate in a more detailed manner the idea along this line, I want to suggest a few rotations that might be profitable. These rotations are based on the idea of one crop to be used as a cash crop and other crops to be used for general farm purposes, such as hay and grain, because we recognize in the Farmers' Co-operative Demonstration Work that every crop producer, let him be in the staple crop farming, trucking, or winter vegetable raising, to make his calling most efficient and profitable, should divide his crops into four distinct types. First of all he should have a cash crop for general expense purposes. Second, he should have a maintenance crop, growing everything at home that has to be consumed at home, including materials for the table, and hay and grain for feeding his stock. In his rotation he should include legumes of the different types suitable to his soil and location, and fourth, but not least, he should provide plenty of hay and forage crops for feeding of live stock and have suitable barns and feeding lots for this purpose and in that way produce suitable manure without which no farming or trucking can be made a great success.

ROTATION PLANS

In the rotations which I am going to set forth we will take one crop as a cash crop, and will consider first, snap beans, which is a very important early truck crop. Land growing beans as an early spring crop, for instance, should be planted to sweet potatoes for a summer and early fall crop, and be followed by rye in November for a winter cover crop, this rye to be plowed under in late January or early February. The land can be planted again the second year to beans and this followed by a hay crop, such as German millet for summer, oats as a winter cover crop made into hay in April, and followed by beans again for the third time, using beggarweed for hay

crop, and coming back for the third winter to the rye as a cover crop. This rotation would give beans as a cash crop for their own special purpose three years in succession, at the same time having different root systems in the soil during the rest of the year to keep up a balanced soil condition.

Another important vegetable and truck crop in the State is cucumbers. The methods of rotation in the cucumber production would be something along the following lines: Immediately following the crop of cucumbers, cowpeas or German millet, or both mixed, should be sown at the last working and cured for hay. A second cutting of millet could possibly be had in October. To maintain the fertility and mechanical condition of the soil, it would be advisable to get this mature and then plow it under, especially in cases where the soil was very sandy, this method would be advisable.

In our heavier soils where a depth of ten inches or more is maintained in breaking, material of this nature might be plowed under green, but in that case it would be advisable to apply a top dressing of ground lime rock to correct any acidity that might result. For a winter cover crop oats and rye alternating might be used, and every third year it would be advisable to follow the cucumber crop with sweet potatoes. In this way you would have a three-year rotation using nine crops in the rotation, or at the rate of three crops each year.

SOIL SCAVENGERS

Where cabbage is the early spring cash crop it would be advisable to plant beggarweed, alternating with velvet beans or cowpeas, every third year, planting corn in the rotation as a soil scavenger. It is a recognized fact that we have some crops that can be termed soil scavengers and that are gross feeders. Among them corn comes first, sorghum stands next, followed by oats, and one or two others of the small grain type. Winter cover crops could not be used where cabbage was grown for the reason that there would not be sufficient time to grow a winter cover crop before the cabbage should be planted, it being a long period crop.

Where lettuce is the cash crop it should be alternated with velvet beans and beggarweeds for summer crops and hay, but every third year corn should be grown with the cowpeas or velvet beans in the corn row. In very sandy soil and where root knot prevails to a certain extent, it is desirable to avoid planting cowpeas. The different period velvet bean hybrids could be substituted for cowpeas with good results.

Where celery is the cash crop, beggarweed could be used and cut for hay one year, the following year corn and cowpeas, or velvet beans in the corn, and the third year cowpeas to follow celery, the residue of the cowpea crop plowed under and German millet sowed in early August and made into hay in late October.

CROP RESIDUES

We could, in this way, go over the whole range of crops produced in the State and specify the lines along which crop rotations could be conducted advantageously and line up the best usage of

what we know as crop residues. But as time is limited we will now consider the maintenance of organic matter in the soil by crop rotation.

ORGANIC MATTER NECESSARY IN SOIL

This side of the question is as important as any for the reason that without organic matter in the soil the necessary mechanical changes cannot take place and the water holding ability of the soil is apt not to be up to the standard of what it should be, and, as we recognize that one of the main factors in all crop production is soil moisture, it is very necessary that we should have sufficient organic matter in our soil for it to have the maximum ability to hold water after rainy spells or where a system of irrigation is being practiced.

CLEAN CULTURE

Where clean crops are constantly grown the organic material in the soil becomes depleted because the soil residue from the root system of any crop is not sufficient to maintain the necessary quantity of organic matter and we know that where the loss of organic matter is not replaced it will affect unfavorably the physical, chemical, and biological condition of the soil, with the consequent reduction of crop yields, therefore the use of a crop that has considerable residue other than its root system, such as hay and grain crops, is especially desired in our rotation proposition. We might, at this stage, say something about the physical soil conditions necessary to give us the most desirable and profitable yields. We know each class of crops exercises a specific action upon the mechanical condition of the soil upon which it grows. Grass crops, for instance, with the resultant sod, tend to compact the soil which requires considerable stirring up and breaking down to put it in a condition to give the best results in truck production. We also know that grain crops keep the soil structure in an open condition, and proper rotation gradually alternating these conditions would certainly give the results desired. Following this argument a little further we would say sandy soil would need compacting crops while clay should have what we know as opening crops.

CONSTANT CROPPING

Another argument along the line of crop rotation is occupation of the soil by crops during the whole growing period, which, in Florida, is nominally the whole year round. This would make it desirable to keep the land busy all the time and prevent loss by leaching, particularly during the very rainy seasons. This is especially true where the climatic conditions of our State allow a continuous cropping system.

CONTROL OF CROP ENEMIES

Another line of argument in favor of rotation would be the control of insects, weeds, fungi and all crop enemies. These would be controlled by crop rotation for the reason that each crop is associated with certain weeds, insects, and certain diseases peculiar to itself, so that if a crop were grown for one period and immedi-

ately followed by another kind of crop those enemies could be kept in subjection, whereas the continuous cropping of one variety would be perpetuating the weeds and insects that go with it. This is particularly true with us here where crop enemies abound in such profusion. Rotation of crops is absolutely necessary if we are to maintain the balance necessary for profitable yields.

SAVING LABOR

Still another argument would be the saving of labor that is obtained by rotation of crops, in that we spread our labor over the whole year, avoiding the extraordinary rush that occurs in the Northern states at harvesting time where there are only a few weeks—sometimes only a few days—of good weather available to harvest the whole season's crop.

There is no doubt, whatever, that the twentieth century trucker must adopt methods along the lines thus indicated if he is going to make the success of his calling the times demand.

The systematizing of crop production is one of the most necessary studies, and to do this time and attention must be given to the rotation phase of it, and we know that when once a system of crop rotation as indicated is established, the management of the farm or truck patch is very much simplified as plans can be made ahead even for several years for each individual field of the farm, thus adding the insurance of business methods to the art of crop production and the science of agriculture.

Discussion

Mr. Mead: I would like to say a few words because I have had a number of years of experience in Sanford in vegetable growing. The chairman of the vegetable committee should have been so weighed down by the solemnity of the situation that he could not have waxed facetious. He would have been, had he been a practical vegetable grower.

In growing a crop of vegetables, we have to consider that we have to put more money in the soil every year than is necessary to put in an orange grove and bring it to a successful bearing. As a rule, we cannot raise vegetables as they should be raised for less than $500.00 an acre for each season.

The necessity for co-operation, also, is greater than in any other line, perhaps. This was illustrated this year in Sanford. The whole country was almost bare of celery and the prospects were fine. Everybody thought any kind of celery would make money. A vast quantity of celery was sent off when it was half grown and half bleached. It demoralized the market and at the present time the best of it does not bring more than about 30 cents a crate.

A small place like Sanford is quite able to glut the entire markets of the country by improper handling of any one vegetable. For a while we had an association which took about forty or fifty per cent of the truck and sent it to markets where it was needed. But many of the growers of the association fell away and there is now no systematic way of co-operation to avoid such a condition.

In Sanford, there is a new outlook for us. Of course we use enormous quantities of fertilizer and, after growing vegetables there is a large amount left over and it is possible to grow a corp of corn after the vegetables are taken off. Silos are being put up, and some of the cattle men are going to pay us for every pound we put on the animals. It is estimated that $500 to $600 per acre can be made in that manner, instead of allowing us to go North and spend the money we have left after paying fertilizer bills and enjoying ourselves. This is a very promising future for us. It involves, of course, the erection of cold storage for the beef.

Vegetable business is like a game of roulette. If the weather is unfavorable, we get no money. If the weather is favorable, everybody gets a good crop and don't get our money back because the price gets so low.

Mr. Gaitskill: I suppose that gentleman speaks about the section of the country he lives in. We estimate at our place it takes $100.00 an acre to put lettuce, our most expensive, on the platform; I mean, to grow it and put it on the platform for shipment.

Mr. Hume: This Horticultural Society is not supposed to know anything about vegetables. But haven't you a good vegetable garden at home? If you haven't, you should have. And every last one of you should know how to grow good vegetables and plenty of them for your table.

I have had a garden of 25x50 feet for the past ten years and supplied all the vegetables three families could use for eight months in the year.

I believe in the home garden, and if you people are not having the benefits of it, better get one; not a big one, just a little one. I think if I were to cut mine in half, I would get more vegetables. Keep it eternally going. It is simply astonishing what can be done on a small piece of ground.

Potato Diseases and their Control

W. Blair Clark, Biochemist, Office of Cotton and Truck Crop Disease Investigation, U. S. Department Agriculture

Mr. Hume: We now come to the next item of our program, which is discussion of the Irish potato diseases. I am pleased to introduce to you, Mr. W. Blair Clark, of the United States Department of Agriculture.

INTRODUCTION

Of all cultivated plants the potato is one of the most sensitive to disease and this crop is probably subject to a greater variety of troubles than any other as widely and generally grown. In addition to predatory insects some eighteen or twenty separate diseases, mostly fungous and bacterial, have been studied and the end does not appear to be in sight yet.

However, let no one who wishes to raise potatoes be deterred from the trial by this state of affairs, for not all of these diseases ever attack the crop of a given district in the same season. In fact the growers' calculations are based on a certain amount of disease, and when it occasionally happens, as in 1914, that every important potato section in the country produces a bumper crop the result is reflected in an abnormally low market, with the consequence that growers and dealers alike lose money.

It would be both unprofitable and impossible to describe fully within the limits of this paper all of the various potato troubles. Our attention will be confined, therefore, to a few diseases of common occurrence, either generally or in the State, and to one or two diseases of special popular interest at the present time.

Before taking up the discussion of the more important diseases brief mention will be made of a number of minor ones.

Potato wart is one of the most serious and devastating fungous diseases that attacks the tubers, but fortunately this has not yet gained a foothold in the Unitied States. It has caused much loss in Europe and has become established in Newfoundland. Potatoes from all areas known to be infected with this disease are prohibited entry into the United States, this exclusion being exercised in accordance with the provisions of the Plant Quarantine Law approved in August, 1912.

Silver scurf, another fungous disease attacking the skin of the tubers, is of comparatively recent introduction and has spread rapidly through the Eastern States. It causes no serious loss but depreciates the market value of the potato considerably owing to loss of moisture induced by the fungus.

An affection sometimes known as Rus-

set scab was formerly found chiefly in heavy, irrigated soils of the West, but is now becoming quite common in most parts of the country. The russeting is due to the sterile fungus, Rhizoctonia. The tubers also frequently bear sclerotia of this fungus, small black spots, usually about the size of pin heads, which can be scraped off leaving the skin of the tuber perfectly sound and clean. These sclerotia do no damage other than to mar the appearance of the potatoes; but another stage of the fungus sometimes girdles the stems and stolons of the plants. This girdling seems to prevent the transfer of sugars and starch, for when the stem is so affected aerial tubers are formed at points between the leaves and the lesions on the stem, while the subterranean tubers, if set, fail to grow. As a result there are large tops with a very light weight of subterranean tubers and what starch has been formed stored in worthless aerial tubers.

Potatoes in storage are sometimes attacked by fungi of the genus Fusarium, which causes a dry rot. These are usually wound parasites. The most common one, known through the West as powdery dry-rot, is caused by Fusarium trichothecioides, Wr. The best way to avoid this class of troubles is careful handling to prevent bruising or breaking the skin of the potatoes, and thorough cleaning and disinfection of the storage places.

Internal brown spot is a tuber trouble of which the cause is unknown. It is not fungous or bacterial, but is always associated with dry soils or lack of water at some period during growth. When cut open the affected potatoes are found to be characterized by dry, brown spots scattered throughout the flesh of the tubers. The disease is not transmissible but it is recommended that infected tubers be not used for seed as it is probable that the vitality of the plants will be impaired.

Here in the South and in many sections of the West potatoes are liable to attack by the eelworm, or root-knot nematode (Heterodera radicicola (Greef) Mul.). This worm infests the soil and may attack various root crops. It can be starved out by proper rotations and cultural treatment as described in one or two bulletins of the Department of Agriculture.

Wilting of potato plant is to be observed with more or less frequency. Sometimes the wilting is quite sudden, while again it may come on more slowly. It has been found that three separate diseases are characterized by this same superficial symptom. Two are of fungus origin and one bacterial.

Verticillium wilt, caused by the fungus, Verticillium alboatrum, Reink, occurs in the more northerly states. The wilting due to this fungus is usually quite sudden and results in the death of the hill. The mycelium of the fungus fills the vascular bundles of the stem, stolons, and usually the tubers. The spores also often cover the dead stalks, rendering them conspicuously gray in color. Sections in the stem ends of the tubers show dark brown to black discolorations. Similar markings or stains are to be found in the upper portions of the plants, even to the tips of the stems. This disease has not yet become serious, being found only in isolated hills. All infected tubers should be rigidly ex-

cluded from the seed as their use would carry the disease into the growing crop.

Somewhat further south, in sections where potatoes as a main crop are subject to hot summer temperatures, the Fusarium wilt (F. oxysporium, Schlect.) occurs. The outward manifestations of this disease are quite similar to the preceding, except that the wilting takes place more slowly. The internal attack on the plant is also somewhat similar. The spots where the mycelium occupies the vascular bundles are not so dark colored and the growth of the mycelium does not extend so far up in the stems of the plants. But the losses due to Fusarium are vastly greater than those from Verticillium. This is closely related to, if not identical with the fusarium wilt of cotton, melons, tomatoes, etc., and the total losses from these wilts must be hundreds of thousands of dollars annually. As yet the control of the disease is not thoroughly in hand. As in the case of practically all other diseases, attention should be given to securing healthy seed and the practicing of rotations that will discourage the increase of soil infection. Meanwhile efforts are being made to develop resistant varieties.

In still more southern states, especially along the Atlantic from Maryland to Florida, a bacterial wilt sometimes attacks not only potatoes, but tomatoes, eggplants, and peppers. The death of infected plants is usually quite sudden. The wood vessels of the stem are discolored, and the tubers show dark rings, decay ordinarily being prompt. No practical remedy has been worked out except to avoid using for seed potatoes from an infected crop.

Mention may be made at this point of three other diseases visible only in the vines but which are transmissible through the seed. These are Leaf-roll, Curly-dwarf and Mosaic. This is a group of comparatively new diseases, of which the causes have not been ascertained. No one of them seems to be invariably or even usually accompanied by any constant species of fungus or bacterium. In each case the vine possesses a characteristic appearance not easily mistaken after the observer has seen it a few times. In all cases such tubers as are formed seem to be absolutely normal in-so-far as macroscopic and perhaps microscopic appearances are concerned, but their yield is materially less than that from healthy plants and if the potatoes which are produced be used for seed, the diseases reappear in most of the progeny, frequently in 95 per cent of the hills.

Leaf-roll seems to be considered the most menacing of this group of diseases. A tremendous lot of literature has appeared on this disease in the last five or six years, yet very little actual progress has been made in learning either its nature or a remedy. Most of its mischief has been done in Europe although the Greeley district in Colorado has suffered heavily from its inroads. The disease is characterized by an upward curling or rolling of the leaves along the axis of the midrib. In advanced stages the leaf may form a complete cylinder. Entire fields become affected to such an extent that it is useless to spend time digging the few potatoes formed.

In Curly-dwarf the leaves assume a crinkled appearance somewhat like the Scotch kale or Savoy cabbage. The stems,

petioles, and leaf vines are shortened, so that the whole plant is dwarfed. The color of the foliage is about normal. Affected plants are usually isolated, being found only here and there throughout a field. But the disease has been found all the way from Maine to California. It occurs in all stages also, from plants whose abnormality can hardly be detected to those so badly attacked as to be worthless. At present this disease is of less importance than the preceding, although it is being watched and studied carefully.

Of the three diseases belonging to this group, Mosaic is the one that should be of most interest just at present in Florida. The occasion for this interest is at least two-fold—the disease is quite prevalent in Maine, where most of the Florida seed is derived, and it has already appeared in Florida. In one field visited by the speaker in company with Dr. Rosenbaum of the same office, by actual count of more than one hundred consecutive hills in one part of the field 67 per cent were Mosaic hills, and it was estimated that the entire field of thirty odd acres contained between 30 and 40 per cent of the disease.

In this field fifty diseased hills were selected in such a manner that within three or four feet of each there was an apparently healthy hill with nearly the same size top. Each of the one hundred hills so selected was marked with a stake, the stakes for the fifty Mosaic hills being marked in addition. Arrangements were made with the owner and it is our intention to harvest these hills by hand, making a careful comparison of yield and such other data as may prove of value in the study. The disease has already been studied quite carefully at the Maine field station of the U. S. Department of Agriculture, where healthy and diseased hills yield in the ratio of ——— to ———. The test down here will give a further comparison under Florida conditions, and it is proposed to plant the diseased tubers grown here in Florida back in Maine, and perhaps other Northern points, to see whether the disease still persists with unchanged characters after undergoing such wide variations in soil and climate conditions.

In outward appearance the Mosaic disease is characterized by a somewhat mottled effect on the leaves. The extreme color variation is from a dark healthy looking green to a rather light, yellowish or "sickly looking" green.

Occasionally this color extreme is observable on a single plant, but more often the variation on a single plant covers a narrower range, sometimes being barely visible. Once learned, however, the observer is hardly likely to mistake it in his diagnosis.

The only practicable protection known against this group of diseases is to go before the vines die down into the fields from which it is proposed to secure seed and note the presence or absence of the diseases. If any of them are present in considerable quantity the entire field should be rejected for seed purposes. If but a few scattered hills are found the field should be accepted only if the diseased hills are dug out and removed before the general digging is begun.

There are two other important diseases transmitted through the seed which cause blighting and death of the vines; but both

of these troubles are apparent in the tubers and can be controlled in part by care in seed selection.

The first of these that I shall discuss is the bacterial disease known under the common name of Black-leg. Tubers infected with this trouble show a blackening and softening at the stem. There may be an area about the diameter of a pencil or slightly larger which is so soft that a pencil or similar object may readily be pushed into the very heart of the potato. If the potato be split through the stem it will be found that a soft black rot extends from the stem inward. This is caused by the Bacillus phytophthorus apple or related forms, and if left alone long enough will rot out the entire potato, working from the heart outward.

When an infected tuber is planted the organism works up through the heart of the potato stem, finally eating its way to the surface of the stem around an increasing transverse area thereof, so that the plant first wilts and then dies prematurely. In this final stage there will be a blackening of the stem externally as well as internally.

In the North the bacilli causing the disease do not appear able to survive the winter in the soil, but in sections where the ground never freezes appreciably soil once infected is likely to remain so for more than one season. It may be starved out by a suitable rotation. Fortunately the disease does not easily communicate itself from plant to plant in the field. The facts recited lead to a comparatively simple means of control. In the first place the Northern seed grower should go through his fields at frequent intervals digging out and destroying all hills infected with Black-leg. This can be easily done as they are quite noticeable to an experienced eye. If conscientiously carried out this roguing should practically eliminate the disease from the seed. If in the course of cutting the seed it be found that any infected tubers have been overlooked the knife should not be used on another potato until it has been placed for a time in some strong disinfecting solution, as formaldehyde, mercuric chloride, or copper sulphate. Should any appreciable number of infected potatoes be found the whole lot should be disinfected by one of the dipping or fumigating methods, directions for which can be secured from either the Experiment Station or the Department of Agriculture at Washington. This last mentioned treatment is not for the purpose of rendering inocuous those tubers in which the disease has already made some advance, but is simply to kill any chance organisms that may have escaped from such tubers and lighted on the outside of potatoes otherwise sound.

The other blight-producing disease of which mention was made in this connection is that usually known as the Late blight, sometimes as the Stinking blight. A fungus known as Phytophthora infestans De By. is the responsible organism. Historically this was the first great devastating disease of the potato, appearing in the forties of the last century. This fungus does not develop readily in continued dry or hot weather as the spores will not germinate. But under conditions such that drops of moisture remain on the leaves for twelve hours or more at temperature ranges between 55° and 80° F.,

the spores germinate very rapidly, after which the organism may reach the fruiting stage within a few days. Under favorable conditions the mycelium of the fungus permeates the leaves of the plant so rapidly that it dies very quickly.

The spores formed upon fruition are so numerous that if at first but one or two plants are infected these will furnish spores sufficient to inoculate a whole field if the wind is in such a direction as to carry the spores over the remaining vines. These spores being so widely distributed in a few hours' time and then germinating so nearly simultaneously, accounts for the fact that a farmer sometimes sees his entire field go down with blight within the space of one or two days.

The remedy for this disease is to spray with Bordeaux mixture. When properly made this is a very fine suspension in water of an almost but not quite insoluble copper compound. Drying upon the leaves this substance remains inactive until a drop of moisture falls upon it. Then a very slight amount of the copper compound dissolves, sufficient to saturate the drop. This requires but an infinitesimal quantity of copper, but the toxic action of this metal is so strong that the trifling amount which goes into solution is enough to inhibit the germination of any fungus spores which may come in contact with that particular drop of water. The excess of undissolved copper remains on the leaf to furnish toxicity for succeeding drops of water. Spraying should be frequent enough to keep the growing leaves thoroughly coated with the layer of copper salt.

In addition to its fungicidal properties copper in small doses acts as a stimulant to plant growth. For this reason plots sprayed with Bordeaux mixture give a larger yield as compared with unsprayed plots, even though there be no blight in the latter. Therefore, over and above its purely insurance protection against blight spraying with Bordeaux mixture will usually more than pay for itself in the increased yield.

The Phytophthora fungus finds its way also into the tubers, where it induces a dry rot marked by sunken, dark spots on the tuber and by a brown discoloration of the flesh, extending in from the outside. This infection will probably not be visible when the potatoes are dug and stored, but unless the storage chamber is kept nearly down to freezing point the rot will develop if the fungus is present. Infected tubers should not be planted as they germinate badly and may assist in starting the blight in the new crop.

Another blight known in the North as Early blight, because of its occurrence before Phytophthora, may occur here in the South simultaneously with or even after the late blight. It is caused by the fungus Alternaria solani. and produces spotting of the leaves characterized by a series of concentric rings somewhat similar to those seen at the end of a log. This disease does not ordinarily do much damage to the potato crop. No remedy is known.

The most universally distributed of all potato diseases is the Common scab, the causal organism of which is Oospora scabies Thax. Until recently this was considered to be a low type of fungus, but there now seems to be reason for believing it to be closely related to certain soil

bacteria. For many years directions have been given to control the disease by treating the seed potato with formaldehyde. But the experience of a large number of growers has shown that under some conditions at least this does not control the disease. Perfectly clean seed, carefully treated with formaldehyde will sometimes produce a very scabby crop. This is, of course, explained by the fact that the disease organism is in the soil. On the other hand very scabby seed which has been subjected to no remedial treatment sometimes produces a perfectly clean crop. This can only be due to the fact that in such cases the soil conditions inhibit the growth of the organism. Control of these soil conditions then would seem to be the most logical way to control the disease.

These soil conditions are not as thoroughly understood yet as it is hoped they will be before long. In general, we now know that the Oospora requires an alkaline or neutral soil reaction for its development and that distinctly acid soils will not produce scabby potatoes unless an alkaline fertilizer be used. Scabby spots in fields otherwise clean are usually the result of having burned log heaps at such places, or to some similar cause that has left the soil alkaline. These spots may be eliminated by treatment with some acidifying material used in sufficient quantity to somewhat more than neutralize the alkali.

In the eastern part of the country and to some extent also in the West, Powdery scab has recently obtained a widespread interest. This disease is caused by one of the slime moulds, Spongospora subterranea (Wallr.) Johnson. In a recent article in the Journal of Agricultural Research Kunkel has shown very clearly how the plasmodium (or slime) of the organism works between and into the cells of the tuber and roots, stimulating them to abnormal growth and thus giving rise to the small warty excrescences on the surface. As the Spongospora matures, with the formation of spores, it dries out and by the time the skin of the tuber breaks over the top of the wart the spore balls are ready to issue as a fine brown or olive colored powder.

Under suitable conditions of moisture and temperature the plasmodium may penetrate to the very heart of the potato before fruiting, or again, the first crop of spores may regerminate within the same tuber that harbored the mother plasmodium and the new plasmodium so formed work its way still further into the potato. In either case there is produced what is known as the canker stage of the disease.

Again, the wound formed by the breaking of the tuber skin over the top of the warts has no cork layer below the powder and a way is thus directly opened to the flesh of the potato for the entrance of various rot producing organisms. For this reason storage losses are liable to be high with potatoes considerably infected with Powdery scab. Losses of 30 per cent to 73 per cent have been noted.

It was a knowledge of these general facts coupled with a lack of any definite information regarding the exact conditions under which the serious losses from the disease developed that justified the Federal Horticultural Board in placing under quarantine those sections where Powdery scab was found. In the United

States the disease was first found in Maine, and at the time the domestic quarantine was promulgated it was supposed that it had not existed there more than two or three years. Subsequent events have shown that it must have been present but not distinguished from common scab for at least fifteen years. During 1914 and 1915 Powdery scab was found in five other states, viz., New York, Minnesota, Washington, Oregon and Florida. Of these the infection in New York was the only one of any consequence. In the light of present knowledge none of them need be considered dangerous, although in the Northern States some attention should be given to proper control of conditions. The development of Spongospora is favored by damp, rainy and cloudy weather, coupled with poor drainage or soil that is tenacious of water.

In the course of experimental work with the disease badly infected tubers were planted in fifteen different localities along the Atlantic coast states at not one of which was an infected tuber found in the resulting crop. However, out of twelve lots of soil shipped from as many of these localities to Northern Maine and there planted with infected seed, eight produced infected crops. Thus evidently Powdery scab is a disease of climatic conditions. In some Maine fields more than 75 per cent of the tubers were infected. In the few fields where the disease was found in Florida the infection did not pass 1 per cent in the worst cases and in most cases it was a mere trace, say three or four potatoes out of several barrels examined.

After the acquisition of the above information, along with much more of a similar trend, of which lack of time prevents presentation here, the Federal Horticulture Board felt that the quarantine against Powdery scab had served its purpose as a precautionary measure and could be revoked with entire safety to the potato industry.

Before leaving the discussion of this disease it should be mentioned that there are at least seven other solanaceous plants whose roots act as host to it. Of these the tomato is the most important. This fact was only discovered last season (1915) and it is not yet known whether any considerable significance attaches to the discovery. The plants on which the infection occurred were under observation in Northern Maine.

In conclusion perhaps some general observations on the subject of control measures would best clinch this paper, for after all our practical interest in these diseases simmers down to the question of getting rid of them in our fields and storage places. While a considerable number of diseases have been cited (and the list was not exhausted in the citations) it will have been observed that the remedial measures are comparatively few, and almost without exception these few measures are things which go with better farming and help to produce better yields even if all serious plant diseases are entirely eliminated.

First in order is attention to the soil, its preparation, drainage, fertility, and bacterial content, the last two to be maintained by proper fertilization and rotations. Upon this hinges a large fraction of the control of the scab troubles and also it constitutes a considerable element

in controlling the various vine diseases known collectively as blights.

Having a suitable soil in which to plant, attention should next be given to planting only healthy seed. Most of the diseases which have been discussed may be transmitted with the seed, some of them only in that way. Many of these, as the scabs, Black leg, Phytophthora blight, the fungus wilts and eelworms may be detected in the seed and should not be planted. The farmer has enough to contend with in the uncertainty of the season without deliberately planting the seeds of trouble. Even in the case of common scab it is best not to plant scabby seed if clean seed can be secured. If there is any suspicion that the seed is not absolutely clean and healthy it should be treated with formaldehyde or mercuric chloride to kill any chance spores adhering to the tubers, remembering that this treatment is of no value for infections embedded within the potatoes.

The only way to insure against the inheritable diseases not visible in the seed, Leaf roll, Curly dwarf and Mosaic, is to buy only such seed as carries with it a dependable guarantee that the fields in which it was grown were free from these diseases. The manner of securing such a guarantee is of considerable interest but lack of time forbids its discussion now.

As soon as the crop is well started in growth, say five or six inches high, regular spraying should be started, the strength of mixture and the frequency depending somewhat upon weather conditions. This spraying is for the double purpose of stimulating yield and insuring against such blights as are spread by the germination of spores on the foliage. In warm, bright, dry weather a Bordeaux mixture of 3-3-50 may be used, increasing the formula to 4-4-50 or 5-5-50 in case of wet, muggy weather, especially if the temperature be between 55° and 75° F. most of the time. If rain washes the mixture off before it has time to dry another application should be made immediately following the rain.

While the crop is growing, isolated hills, dead or dying from Black-leg, blight, or wilt diseases should be removed and destroyed. If the potatoes are being grown for seed this roguing should be extended to include Mosaic, Leaf roll and Curly dwarf.

Finally, when the crop is ready to harvest, the potatoes should be dug and handled with sufficient care to prevent bruising and wounding, and if to be stored they should be put in a clean place. These last mentioned precautions will prevent the entrance of wound parasites during transit or storage.

Entirely aside from the question of disease the precautions which have been described will bring out, other things being equal, a larger crop of nicer looking, hence more marketable potatoes than can be obtained by any haphazard methods; the proof of which is to be found in the experience of good managers who have tried it.

Mr. Hume: We will now take up the next topic on our program, "Ornamentals for Florida Conditions." The chairman of this committee is Mrs. R. E. Rose, of Tallahassee. I am pleased to introduce to you, Mrs. Rose.

Mrs. Rose: This paper was prepared describing particularly the plants which thrive at Tallahassee and similar climatic conditions. But I am sure most of them will do well in almost all parts of Florida.

Ornamentals

Mrs. R. E. Rose, Tallahassee

Mr. President, Ladies and Gentlemen:

Just why your president should have chosen me for such a distinguished honor, as chairman of the Committee on Ornamentals, I have been unable to decide, because he knows that I have been so busy getting my own place in shape and keeping it so, that, although I have a great interest in such work, I have neither the time nor the knowledge to tell others how to do these things. However, I have been fortunate in securing good help from my committee and other members of the Society who have prepared papers at my request.

I assure you that I appreciate the importance of this appointment, not only because it is such a great honor, but also because I hope, in a small way, to bring to the notice of this Society a part of the State not so well known by some of you, but which has a very wide range of native ornamental trees, shrubs and vines, besides a host of annuals and perennials.

Feeling that I did not have time to prepare a suitable address on the subject I wished to bring to your attention, and knowing Mr. E. Peck Green to be much more capable of preparing such a paper than I am, and that he is an acknowledged authority on such subjects in our city (Tallahassee), I persuaded him to write one for me.

I am sure the citizens of Arcadia, and also a good many members of this Society will remember Mr. Green, for he still claims Arcadia as his home. He cannot be with us, and, as I feel confident that you will all enjoy what Mr. Green has to say to you, I will, with your permission, read his article.

ORNAMENTALS FOR MIDDLE NORTH FLORIDA

E. Peck Green

TREES

Among the trees in this part of the State (Middle North Florida) the oak stands pre-eminently the most desirable for shade or avenue tree. The live oaks up here are noted for their size and beauty.

The pecan is an ideal shade tree of rapid growth. It is alleged that the jaybirds planted the first pecan tree in this part of the State. They have been known to fill a hollow tree full of these nuts. This tree is of advantage to us in that it

sheds its leaves in early fall and is late in putting forth new growth, for in this part of the State we need the sunshine during the winter months.

The sweet gum is another beautiful tree for the lawn, especially in the fall, when it takes on the autumn tints. It has one draw-back though, the ground is littered part of the year with its fallen burs.

The magnolia is another good avenue tree, and if the home grounds are of some extent it makes a splendid lawn tree. Being a broad-leaved evergreen, it makes a rather dense shade and is not suited to be planted with shrubbery.

The camphor is an ornamental tree that deserves a place on our lawns when left to grow at will; when used as a hedge it surpasses the privet, in that it is free from insects, especially the whitefly, which attacks the privet to a great extent.

The Chinese tallow tree is another rapid growing tree good for the lawn. In early spring it is covered with peach-like blossoms.

If the grounds are of some extent, the dog-wood and the wild plum (hog plum) should find a place where their beautiful white blossoms will greet you in early spring. The wild crab-apple is another tree (or shrub) that should find its place on our estates.

The stinking-cedar (torreya) is our most handsome conifer. As a single specimen on the lawn or near a tall building it makes a striking picture. This tree grows wild only along the Apalachicola river in Gadsden and Liberty counties. It is kin to a species found in California and Palestine.

The spruce pine is native to this section and is a most handsome tree when given plenty of room to show off its symmetry.

The Washington, Phoenix and cabbage palms are most beautiful ornamental trees, but this part of the State should not give them too much emphasis. As single specimens or in groups here and there about the home planting or in parks they have their place, but as an avenue tree on a narrow street they are not as suitable as our native trees. All palms should be given plenty of room to show off their beauty, or should have taller trees in the background with shrubbery in the foreground.

The cherry laurel, holly, maple, elm, Lombardy poplar, silver bell and maidenhair tree are all suited for our lawns.

SHRUBS

There are an infinite number of shrubs that thrive here. The most beautiful is the hydrangea. It is a delight to behold when it is covered with its huge trusses of blue (or pink) flowers. If the flowers have a tendency to be pink, and blue is desired, feed them alum, using a teaspoon to a gallon of water. Iron rust has the same effect.

The azalea is another magnificent shrub which does well here if given proper treatment and should be planted more than it is. The soil for this shrub should be largely made up of leaf mold, rotton field sod, manure and sharp sand, and should be free from lime.

This section is the home of the rose and all do well with the exception of the American Beauty and Rugosa. Roses should have a plot to themselves as they are not very ornamental when not in

bloom. They should be placed to the side of the yard or to the back and should be treated more as a bedding plant than is the general practice. They should be planted closer together and kept well pruned. Of the climbers the Dorothy Perkins seems to be the most desirable, though there are others that are equally as handsome. In early spring the woods along the roadsides are festooned with the Cherokee, which makes a sight to behold.

The oleo fragrans, althea, camellia japonica, crape-myrtle, magnolia fuscata, euonymus japonica, spirea and pomegranate all do well in this part of the State. The crape-myrtle, styled as the Florida lilac, should be found in all our landscape work. It is better to be kept pruned back to shrub form. The euonymus japonica should also be kept well pruned, as it has a tendency to become scraggy. It also makes a splendid formal hedge.

The camellia japonica is our most handsome winter flowering shrub, but it is a slow grower; it is also a prey for whitefly and other diseases.

Abelia grandiflora is a very handsome evergreen and should be used more extensively. It is an indispensable plant to give artistic touch to a planting, such as against the house and porch foundations or along the fence.

As an informal hedge nothing is as handsome as the pitosporum, also it makes an ideal planting for entrances to public buildings.

The arborvitaes do well here and are very desirable for cemeteries and formal planting.

VINES

Of the vines for this part of the State the climbing rose holds first honor, especially for the porch and pergola. The clematis, peppervine, kudzu, honeysuckle, trailing lantana, fig-vine, ivy, pink-vine (mountain rose), star jasmine, wistaria, yellow jasmine and many more help to make places mellow which would otherwise be bare and an eye sore. To cover steep banks where it is impractical to have grass, honeysuckle and trailing lantana serve an ideal purpose. The wistaria, the climbing tree, is our grandest flowering vine. It is not desirable as a porch climber, but for an arbor or to let climb trees at will, makes a picture not to be forgotten. It can be kept trimmed to a shrub.

ANNUALS AND PERENNIALS

Violets grow very luxuriantly and are excellent for edging flower beds and borders. The Princess of Wales seems to be the one most desired. The plant stands up about a foot high and the violets with stems equally as long. The Russian violets are more hardy and stand more neglect, but they have not the long stems of the Princess of Wales. Selaginella is another fine edging plant, this is only for its foliage.

Pansies do well if seeds are sown in August or September, so they will be in bloom during the winter and early spring months.

Sweet peas thrive beautifully here in the spring and are counted one of our choicest flowers for that time of year.

Both the annual and perennial phlox do

well and are seen to advantage if planted together with irises and gladioli. Calendulas are one of our best winter annuals and make a splendid edging plant for walks and driveways. They, like pansies, go when hot weather arrives.

The queen among the bulbous plants is the Easter Lily. The daffodil, narcissus, snowdrop, jonquil and Roman hyacinth all flourish here.

Aster, salvia, balsam, petunias, marigolds and a host of others flourish during the hot summer days.

Chrysanthemums are our best fall flowers. Dahlias and golden-glows also hold their own at this time of the year.

Our best lawn grass is the St. Augustine. The chinch bug the past few years has been infesting our lawns during the dry weather. If kept well watered and tobacco dust applied there is little danger from this pest. The Bermuda grass makes a nice lawn if given the proper attention, but it is hard to keep it away from the flower beds—it becomes a pest. The Italian rye is used extensively as a winter grass.

In making a planting about the home place care should be used in making the selection of shrubs and flowering plants. The main plot should be devoted to the open lawn with trees, shrubs and flowers confined to the boundaries; the planting should be irregular, resembling the seacoast in miniature, with points, capes and peninsulas jutting out into the lawn. Flower beds should never be placed in the middle of the lawn, or choice shrubs scattered here and there about it. The walks and driveways should, if possible, have graceful curves, but each curve should have a just reason for being so.

Discussion.

Mrs. Rose: I received my notification as chairman of this committee late in the day, but hope the few papers I have been able to extract from my friends will prove interesting, but for the guidance of future occupants of this ornamental position, I wish to suggest that he or she get in touch with the members of the committee early in the year, and keep at it. In this way the chairman might have something to report at the annual meeting, and might also be able to do some real work for the good of the community by publishing at intervals any items of interest that come under his notice. I am going to ask for suggestions as to the best way to put this matter on a working basis, and hope my friends will help me out.

I have here a paper by a friend of mine who is unable to be present, but I have been, fortunately, lucky enough to find one of the talented young orators of your hospitable and courteous city, who will do ample justice to the subject, I am sure. I take pleasure in introducing to you, Mr. Hugh Jones, who will read a paper prepared by Mr. A. M. Henry.

Mr. Jones: If I were the next speaker, I would say that nothing more could be said about ornamental plants, but I am not the next speaker; Mr. Henry has sent in his paper and I am to read it to you.

It may be there are a few of you present who do not know Mr. Henry, and for

the benefit of those few who do not know him, I desire to mention several significant facts. Mr. Henry for six years served as food chemist under Mr. Rose. He studied forestry in the Baltimore School of Forestry. He is now and has been, for the past year, engaged in citrus canker work. He is now in Dade county, and for reasons best known to himself, was unable to be with you tonight, and it becomes my privilege to read his paper.

Paper of Mr. A. M. Henry.

ORNAMENTAL TREES FOR FLORIDA HIGHWAYS

A. M. Henry

It was a very great surprise to me to be appointed to this honor by the chairman of the Committee on Ornamentals, and I have been wondering how I could show my appreciation. After considering what the Ornamentals Committee has done in the past it seemed to me there was not much left. However, one hears so much of the Dixie Highway with its Paradise Loop, the Tamiami Trail, and other highways that it would seem that a little consideration of the best ornamentals for the beautifying of highways is in order.

Let us consider what the requirements for highway trees are in Florida. The first, and most essential one is that they must either be uninjured by fire, or else by their characteristics of growth protect themselves therefrom. This is essential with the universal custom of allowing fires to sweep the woods and fields of the State, and with the present inadequate laws for even recovering damages when fires are maliciously set. The next requirement is that the trees must be suited to the climate. They must be trees that will stand the hot sun that we have, and still not be too tender to stand a little frost. Naturally, the trees that will be best in the North will not be best in the South. Third, the trees should be able to give a good growth without having to be fertilized or have too much other attention given to them. They must be trees that will stand considerable rough usage as there will be long stretches of highway without habitations. These trees should be trees that will give a maximum of shade. Also the fact that our driest season is the Spring should be taken into consideration, and the trees should be able to withstand the dry weather.

From an esthetic standpoint it seems that these trees should be evergreens in preference to deciduous trees. It is true that for the clay soils in the northern part of the State where rainy winters are common it would be preferable to use deciduous varieties. But except for special places, we ought to have evergreens. It is a most welcome sight for the winter visitors, who come in ever-increasing numbers in automobiles, to have the roads lined with green trees to greet them when they enter the State.

Perhaps it would be wise to vary the species for the topography. It seems that

it would be well to have one type for the hills and another for the swamps, creeks, lakeshores, prairies, etc.

It might be profitable to consider the characteristics of individual species to some extent. In the extreme northern part of the State the difficulty is in choosing one of the many suitable trees, while in the southern part it is to find suitable ones. The only attempt at the systematic planting of a highway in the State, that I know of, is in Dade county, where the Australian pine has been used. This tree has not proven satisfactory for several reasons. In the first place it does not give a satisfactory shade; secondly, it is very easily injured by fire. This year between five and ten per cent of the trees along the roadways of Dade County have been killed by fire. Third, in a great many localities it does not thrive without fertilizer. The palms, cabbage, cocoanut, and Royal, make odd and attractive driveways, but are not adapted to a general and extensive scheme as they do not give any shade. For beach and lakeshore roads they are unsurpassed. In Northern and Central Florida, there is no tree that will surpass the magnolia. At all seasons it is clothed with its rich and green foliage. In the fall the fruits, with their red berries, are picturesque and attractive, while in the spring the white flowers are magnificent. A companion tree to the magnolia is the Gordonia Lasianthus that flourishes in sour, wet, undrained or sandy places. The laurel cherry is adapted to North and Central Florida. The sweet bays (Laurus Nobilis, Persea Species), are excellent where they thrive. A number of oaks are excellent and perhaps the most used of any tree in the State for roadway planting. The holly is perhaps too much a characteristic tree of the North to be very desirable, although otherwise good.

It seems that it would be an excellent idea for the road authorities in each county, in conjunction with the State Highway Commission, to select a comprehensive planting plan for the county; to select a very few species for the county and then extensively plant those. For only by numbers is impressiveness secured. In most counties two species, one for dry localities and the other for wet, would be sufficient; while some counties, with both clay and sandy soils, would require four or five species.

Along in this connection it might be well for this Society to work toward having the State Highway Commission plant nurseries and be ready to furnish to the counties and special districts the desirable trees at cost price.

It seems to me that the most important point in this beautifying of the Highways is whether we will use native and naturalized trees or foreign trees. We have a large enough variety of suitable trees, not to consider the advisability of importing or using foreign varieties. Again, if we use native species, we are not endangering ourselves by bringing in new diseases and insect pests. If we are going to make of Florida "the Playground of America," we want things that are characteristic of Florida, and not something that is characteristic of Japan, Spain, or the Hawaiian Islands. In this connection, it would seem that we would want to have our highways take in as many hammocks

as possible, where we will have the native trees and not have to bother about scenery. In time, the State ought to have at least several of these hammocks in every county set aside as parks. The setting apart of Royal Palm Hammock, in Dade county, is a meagre start in the right direction.

The following outline of the trees suitable for different sections is merely suggestive and not meant, in any way, to be full or to exhaust the desirable trees.

North Florida; Clay.—Dry, Yellow poplar, Walnuts, Hickories, Beech, Deciduous oaks, etc.; wet, Red maple, Linden, Elm.

North and Central Florida; Sand.—Dry, Pines, Holly, Magnolia, Laurel cherry; wet, Gordonia Lasianthus, Sweet bay.

South Florida.—Dry, Wild fig, Mangos, Palms; wet, Australian pine, Palms.

NAMING THE PLANTS

A. W. Allan.

To all lovers of plants and flowers it must be apparent that in these days of wide travel and consequent mingling of people from every state and nation, there exists a distinct looseness in the use of the proper names of the various plants which are now being brought together in Florida. In our wonderful climate we are able to grow not only most of the flowers which our Northern friends are accustomed to see in their old homes, but also many new and rare tropical plants to which there has been applied no common name. The scientific botanist, on discovering these plants, names them arbitrarily, sometimes using a descriptive term, but more often giving them a name commemorative of some scientist whom he desires to honor. The original settler in foreign countries generally adopts the native name of the plant, particularly if it is edible, or lets it go under a name suggested to him by his recollection of trees and shrubs of his boyhood days. In this way we get silk oaks and she oaks from Australia that have nothing in common with our own oaks; Surinam cherries and rose apples that are neither cherries nor apples, and alligator pears which, while they may be pear-shaped, are certainly not in any way connected with alligators, and would be a distinct surprise to the man who expected to find them taste like a Bartlett. To use the botanical name for these little known varieties would be quite impracticable for the general public, involving as it does the memorizing of many hundreds of names in an unknown tongue, even if these names were constant and not liable to alteration by every botanist who finds a slight variation from the type, but it does seem possible that one common name in the English language could be agreed on as the name of a certain plant.

While this is especially desirable in naming the foreign plants that have here-

tofore had no name in the vernacular, it is also very advisable in the case of many plants more or less well known to us all in various parts of America. Ask your neighbors from different states what plants they mean when they use the names "woodbine," "honeysuckle" or "trumpet-vine" and you will find as many descriptions as states. "Black-eyed Susans" may mean any one of half a dozen plants to as many different people. Many seed and plant catalogues serve to confuse matters still more in their desire to give catch-penny and high-sounding names to old familiar plants. Even the humble wild-flower is at the mercy of any individual who chooses to tack a name on to its defenseless head, regardless of the fact that it already has a perfectly good name. Thus we find such misnomers as "frost flower" applied to our beautiful native blue lupine, whose connection with frost must remain a mystery—unless it be that frost means sudden death to it—and the name "petunia" has been heard applied to our lovely Berlandiera, when a little observation would have shown its difference and a little imagination have created an entirely new and original name for this beautiful wildflower, if it were needed

Weeds, too, require a systematized nomenclature, as we find many of them having an economic and medicinal value, and such names as "queen's delight," "oil-weed" or "redshank" do not always identify the plant in different districts. The ragweed, in its various varieties, ought to be known to every one by sight and under one universal name, as it is now generally conceded that the pollen of this plant is the cause of most of the cases of hayfever, and its systematic eradication would be an inestimable boon to thousands of sufferers from this painful affection.

To attempt to alter the nomenclature of the better known wild plants of the older states would be not only useless but iconoclastic, for as long as American literature lasts so long will the giant rhododendron be the "great laurel" or the "rosebay," and the azalea of the Alleghenys will be the "honeysuckle." It would be just as possible to alter the names of the buffalo, the quail or the robin, which originally had no right to these names, but must now be held to have acquired a title to them by long usage; but it is possible to prevent a repetition of this duplication of names—a practice which argues either a great lack of imagination or a distinct disinclination to burden one's memory. It is possible to correct such errors as calling a camellia a Japonica; it is possible to give one general common sense name to such foreign plants as the pyrostegia venusta and the Bauhinia purpurea; and it falls rightfully within the province of the Horticultural Society to do this.

Like all other educational efforts, this will be no easy task. When one hears that the proper name of a rather common plant is pedilanthus tithymaloides, you cannot blame the people for calling it such names as lady slipper, redbird cactus. Jacob's ladder and devil's backbone. Now the lady slipper has already been preempted by a lovely little orchid, and while the flower may be something like a redbird, still it is not a cactus. The crooked stem may be something like a single pole ladder, or even like the backbone of the

devil, of which we know he has plenty, however doubtful we may be as to its shape. But none of these names is the proper one for this odd euphorbiad. The Spanish call it "candillera," because the wax expressed from its stems is used in making candles, but as we do not so use the plant in Florida, that name would have no meaning for us. It seems that the only way to remedy this Babel is for societies such as this to agree on a common name for such plants as are suffering under the incubus of a technical appellation or the disgrace of various aliases, and to christen them so aptly that they will refuse to answer to any name except the one bestowed on them by their godparents. While many of the botanical names are impossible, some of them ought to be adopted generally. The names Poinsettia and Bougainvillaea, recalling two well known horticulturists, are in general use and are evidently here to stay. Why then should we not call the silk oak by its proper name, Grevillea, which is easier to pronounce and to remember than the two last mentioned? The casuarina, called she oak and beefwood in its native home, goes here frequently under the name of Australian pine. As it is no more a pine than the Grevillea is an oak, this name ought to be suppressed. The Pines, bless their beautiful hearts, are a distinct and aristocratic family, many members of which we fortunately have with us in Florida, and they might very properly resent the unwarranted assumption of their family name by interloping immigrants of an entirely different race. The name "pawpaw" is found tagging three very different plants, one of them well known to our Indiana country folks as a small tree that bears edible fruit, another, an asimina, now plenteously decorating the pinewoods with its creamy dogwood-like bracts, while the third, the melon pawpaw, is rapidly gaining supporters for its foreign name "papaya."

Too many foreign fruits are called apples, plums, cherry, or gooseberry with the name of a country added, when there is little resemblance even superficially to the legitimate owner of the name. In such cases it might be well to use the native names, which are generally euphonious, instead of the botanical names, which are often hard to remember and liable to change in these days in which "of making books there is no end." Thus "loquat" or "biwa" is a better name than Japan plum, Japan medlar, or eriobotrys japonica, and they all call for the same fruit. Amatungula may seem rather hard to assimilate, but when we learn how good it is to eat, we will find it as easy to pronounce as carissa edulis and more sensible than Natal plum, because it it not a plum.

Even among the fruits more generally known we find many misleading names, such as strawberry guava. This name to some means the cattley guava, to others a common guava with red flesh. The name "mango" without any varietal addition, is to blame for a great deal of ignorance as to the merits of the noble fruit, and when we have learned to call for a Singapur mango or a Haden mango we will no more expect to get a turpentiny seedling than we would expect to get a crabapple when we call for a Ben Davis. It may be that "a rose by any name would smell as sweet," but if you wanted a rose

garden and only knew the rose by some such name as Christmas rose or rock rose, you would be apt to go very shy on fragrance.

Turning now to the lesser known ornamental plants such as the palms, we will find considerable difficulty in our christening. The botanists themselves are far from unanimous, as is evidenced by the changes in a Seaforthia, which became first a ptychosperma, and finally, perhaps, an archontophoenix. The cocos nucifera is the cocoanut palm, but there are many other cocos which do not bear cocoanuts, but which are very beautiful plants. Many people do not understand that, while the date palm is the phoenix dactylifera, all phoenixes are not date palms. To others again all fan-leaved palms are just palmettoes, and as such are looked on askance, carrying as they do recollections of poor soil and expensive clearing. The fact that the cocoanut, the date, and the palmetto are the only palms whose common name is universally known shows that for anything to impress itself on the public mind, it must first touch the public's stomach or its pocketbook.

The cactus family, which already has enough diverse species of its own, is often saddled by unthinking people with plants of a totally different order. Thus we hear the century plant called cactus, though, botanically it is much more nearly connected with the lily; while under the all-spreading wing of the term "lily" we huddle such various plants as the irises, the crinums and amaryllises, the nymphaeas, the narcissus and jonquils and many others that well deserve to go by their own name, and they mostly have very good ones if we would only get into the way of using them.

Another overworked name is "trumpet-vine." It might be hard to tell a man that his own particular vine was not a trumpet vine, but it ought not to be impossible to make him understand that there are many different vines carrying flowers just as trumpet-shaped as his, and that when he uses that name, he does not give his hearer any clear idea as to which of them he means, even if he can describe the color, which, though you would insult him if you were to say so, half the time he cannot do. The bignonias, the Thunbergias and the true honeysuckles, three families which include most of our finest and best known vines, all bear trumpet-shaped flowers, and the different members of the families ought to have specific names.

While we cannot hope to bring about any revolutionary changes in the established order of things, we can, by carefully using the most appropriate and generally accepted names, exclude or render obsolete many errors, and by having a recognized society such as this take charge of the naming of new introductions, prevent the recurrence of avoidable mistakes.

To some this may seem non-essential or even trifling, but when we think of the care and expense gone to by our paternal government in the matter of naming and labeling our foods and drinks, it should not seem unreasonable that the original sources of these products be correctly named. Exact knowledge is not a mass of vague generalities, but is built up out of a great many carefully acquired details, and

only in the correctness of our details lies the strength of our knowledge.

Discussion

Mr. Hume: The discussion of this topic will now be taken up by our vice-president, Mrs. McAdow.

Mrs. McAdow: I see here by this program that the discussion is to be by Mr. R. T. Weddings of St. Petersburg, Mr. Werner F. Nehrling of Orlando and Mrs. Marian F. McAdow of Punta Gorda. I think Mrs. McAdow is the only one present at this meeting. How can we discuss anything?

I think, after hearing these three excellent papers, there are a great many things I would like to say to you about them. To go over them would mean that we might take up more time than we have to spare this evening, because there are some papers to come yet, and the musical program, but one part of Mr. Henry's paper is so pertinent I would like to say just a little bit about it.

Some of you people know that here in DeSoto county we are building new roads. We have now bonded for about a million dollars for building these roads, and there are possibly two districts yet to be heard from that have not bonded. Inside of another year we are going to have good roads pretty well over this county. We are going to connect with the Tennessee Highway and Tamiami Highway. The time to do something is right now, to make these highways beautiful.

Over in California they build their roadways much wider than those that are being built here. We are hard surfacing our roads to a width of eighteen to twenty feet, where they are hard surfacing them fifty or sixty feet. Right now, before the permanent road is put down, is the time to take up the systematic planting of those roads.

Over there they have planted a double line of palms and then, besides, the sides of the road are planted with eucalyptus, or paper trees. I think now we should start the matter of planting these roadways for the future. They are not hard surfaced now, and this would be the proper time to start the work.

In some parts of Southern Florida, we are having commissioners appointed to look after the planting of city streets. I cannot see why this interest cannot be extended to the highways, too. The time will surely come when you will have to do so. We want to be as up-to-date as anyone. Where a commissioner is appointed to look after this planting, it is generally systematically done and the results are better.

I have had this matter in my mind for some time. I took a trip in February and went to some parts of the State where I had never been before. There were some beautiful trees surrounding the homes in many of these places. But there was no system in their planting. There were many varieties, and those who had trees which had been there many years, loved them, of course. But, really, there is something very like the old crazy patchwork after all; this hotch-potch planting. There would be, possibly, three or four oak trees, three or four palmetto trees,

half a dozen camphor trees, all growing in a line and possibly all in one or two blocks.

But we don't make any more crazy patchwork; we have grown out of that. And the time is coming when we are going to look at this tree growth and it will look as out-of-date as your crazy patchwork quilt. And when that time comes you are going to have trees that are forty or fifty years old, perhaps, and you will not want to take them out, and those who have lived with them for a generation will not want to sacrifice them.

So I say now is the time to look after the planting of these highways.

When I was in Oneco, I visited Mr. Reasoner and in talking over this matter with him, he told me in Bradentown and Manatee, they had a board of commissioners apointed to look after planting these highways. He outlined the course they intended to pursue in cutting out this promiscuous planting and getting it uniform, and the sources of revenue they would have to depend on.

I also talked later on with Mr. Hendry in Fort Myers. Mr. Hendry told me he was on a Board of Commissioners to look after the planting of the city streets. If you know a plan is actually in existence now and something is going to be done about it, you can watch it and inquire about it, and if you want to introduce it yourself in your own home community, those are the men to inquire of.

Mr. Reasoner, if you will favor us with a short outline of what you have done around Bradentown, we would all be glad to hear you, I am sure.

Mr. Reasoner: In Bradentown there is some talk about this commission and I am sure it will go through, but so far it has not materialized. In Fort Myers it is an actual fact and Mr. Hendry is on the committee. He told me only a few days ago that he would be here.

The committee was given power to act; they could remove any objectionable trees and could plant systematically.

Of course, this will be extended for county work and for different routes, the Tennessee Highway, the Tamiami Highway, and other roads.

The county commissioners, I should suppose, had something to do with appointing these committees.

I am sorry I have nothing more to report. I suppose by the next meeting we will hear more definitely how the Fort Myers commissioners have worked out their scheme. It seems to be working out all right.

Mrs. McAdow: I am sorry I made the mistake; I thought you had gone farther in your plans.

I remember what Mr. Hendry told me, and I hope I am not mistaken in this. He told me the city council saw their way clear now to let them have $2,000 a year for carrying out this work. I suppose they have only 4,000 or 5,000 people, and if they can afford to give these committees $2,000 a year to carry out this work, there are surely many other towns that can do as well. I think the $2,000 allowed them is to be used entirely for the work. They do not receive any compensation for their own efforts. These three men are doing it for the good of the community, and they use this $2,000 in removing whatever trees are objectionable and planting oth-

ers, and Fort Myers is more beautifully planted with tropical trees than any other town I have seen in Florida.

I have just thought of another thing I wish to speak about and that is, in one of these papers a reference was made to the use of the Australian pine tree, which is used very extensively on the east coast. This gentleman said it was not a very desirable tree because it had to have care, it had to have fertilizer and was easily injured by fire. But we are planting them right along, and we are planting eucalyptus trees, that have many more undesirable features than this Australian pine.

In my town, it will be no time before those eucalyptus trees are going to get into the sewer pipes and then it will be a question of great trouble and expense to get them out. It is like suddenly finding a giant on your hands, where you thought you had a dwarf. In California, no eucalyptus tree can be planted within sixty feet of any sewer or drain pipe.

How much wiser it would be to put the planting of city streets and highways into the hands of commissioners who know what they are about!

If any one here wants to make any suggestions, we will be pleased to hear from them.

Mr. Dade: I would like to ask if anyone has found any trouble with the Australian pine. On the east coast many of them have turned yellow. Someone asked me a short time ago, and said he had found a flat-headed borer. They had worked all the way around the crown. They say it commences with a kind of beetle, and were anxious to find out if anyone had seen it anywhere else. This is on an island near Hobe Sound.

Mr. Rose: I understand they had considerable trouble around Miami on account of a beetle attacking the tree. They acted very much as a peach borer does; traveling around. They are not peculiar to the Australian pine.

Mr. Dade: In some cases the tree started a new growth around the edge of the wound, just as our orange trees do around the collar, but in many cases the pine was completely circled.

Mr. Goodwin: I saw two or three trees of Australian pine in the condition Mr. Dade describes, and I was told it was caused by nematodes, or root knot.

Peaches and Other Deciduous Fruits

W. L. Floyd, Gainesville

These are fruits that should be grown especially for home consumption. If the right varieties are selected, and proper attention given to their culture, fertilization, spraying and pruning, the Florida settler may enjoy through a long period a variety of fruit that will add much to the enjoyment and healthfulness of his family.

Your committee treated peaches, plums and pears very thoroughly in reports of the past two years. We wish to emphasize the idea advanced last year of doing most of the pruning of peaches in summer immediately after the crop is gathered. This stimulates the formation of new branches in time for the flower buds to develop thereon before growth ceases, thus insuring an abundance of flowers the following spring. Winter pruning has been taught so long, and emphasized so strongly by horticulturists for trees in general, that we have some difficulty in getting away from it, but when a study of the fruiting habit of this species is made we can see the force of the argument in favor of the change of time. Winter pruning stimulates new spring growth which will bear no fruit but draws nourishment from the fruit bearing branches, and so shades the fruit produced thereon that it will not be well colored.

Thinning the fruit is quite important also; the more so if we so prune as to cause an increased development of fruit buds. The peaches should be thinned after danger of frost is past to from 4 to 6 inches apart. Much finer fruit will thus be obtained and the vitality of the tree will be conserved.

San Jose Scale, Curculio, borers and nematodes are some pests attacking the stone fruits which should be fought regularly and systematically.

Spray with lime-sulphur in winter and use the parasitic fungi in summer for San Jose Scale.

Spray with arsenate of lead just after the petals fall for curculio followed by a second application two weeks later.

Go after the borers with a sharp knife and a pointed wire in fall and again in early spring.

Plant peach trees grafted on plum stock of nematode infested land, which is usually any light soil that has been long cutlivated. Plums are not attacked by this pest.

Fungus diseases, such as brown rot, scab, etc., may be held in check by use of lime-sulphur spray. Bordeaux mixture should not be used on stone fruit trees because of its injurious effect on their foliage.

JAPAN PERSIMMON

This fruit is gradually increasing in popularity. It grows well in a variety of soils, is free from root knot, is an easily grown and desirable fruit for most parts of Florida.

It is propagated by budding or grafting on native persimmon stock, bears at an early age and where pollination is secured it bears heavily.

Two kinds of flowers are borne, so much alike that for a long time their difference was not detected, the greater number on most trees are pistillate, within recent years varieties have been found which bear largely staminate flowers, when trees of these are planted among the pistillate bearing ones, pollination is effected and good crops insured. Some of our nurseries now supply staminate varieties.

The Tane-Nashi is seedless, hence does not require pollination. It is the most popular variety, as it is large and of fine quality when thoroughly ripe. It has been dried by slicing and evaporating by artificial heat and the product is comparable to dried figs or dates.

The fruit is richer in sugar than apples, peaches, pears or oranges. Until thoroughly ripe it is astringent; this has been a hindrance to its popularity in northern markets. When shipped each basket should contain a printed slip cautioning the purchaser not to eat till fruit becomes soft, when the astringency will have disappeared.

A comparatively recent introduction from China is the Tamopan persimmon. The fruit is large, flattened, and has a constriction about the middle as though a string had been tied about it while growing; flesh is light colored, and when fully ripe is of excellent quality. It is worthy of a place in every planting.

The flat headed borer, the larva of a small beetle is the most troublesome insect attacking the persimmon.

Eggs are laid in spring and summer in cracks and under scales of the bark on trunk and branches. The larvae eat through the bark and excavate channels in the sap wood. These channels may be located usually by the discoloration on the bark or by the saw-dust castings thrown out of the burrows. The best remedy is to dig them out with a knife.

FIG

The fig grows best in clay or heavy soils which hold moisture well. Growing in sandy soil is often unsatisfactory, when attempted an abundance of humus should be supplied in order to increase the water-holding capacity.

Varieties which do not require pollination do best here. Some well suited to Florida are Celestial, Brown Turkey and Brunswick. These are easily propagated from hardwood cuttings, taken from branches of bearing trees. The sprouts which come up about the base of plants should not be used.

It is best to make three or four trunks develop rather than one, by cutting back the main stem at the time of transplanting. A number of sprouts will soon develop at or near the surface of the ground; all except those wanted should be pruned

off early, and future sprouts that come so abundantly should be taken off promptly.

Those varieties which require pollination do not grow satisfactorily here, though they have been tried many times. The climate is evidently unsuited to them. The Magnolia, which is such a favorite variety in Texas, is not satisfactory because its fruit splits and sours on the trees during our rainy season, which comes when it is maturing.

Nematodes, producing root knot, are probably the greatest pest attacking the fig. These are more abundant in sandy soil and are often largely responsible for fig growing being so unsuccessful in the light soils of the State. Occasionally a tree is seen against a house or in a back yard where constant tramping has made the soil compact, which is quite large and fruitful. In such positions nematodes do not thrive and the shallow roots are undisturbed by cultivation.

A disease which has in recent years been found attacking the fig in several parts of the State is Rhizoctonia, one of the several fungi which cause damping off of seedlings in plant beds. It attacks the leaves and tender stems near the tips during the warm humid periods of summer. The white cobwebby filaments of the fungus may be seen on the affected parts with the naked eye. The diseased parts soon turn brown and die. It spreads slowly from one part to another on the plant and holds over from one season until the next by means of small brown or black sclerotia on the dead twigs, or on the fallen leaves, and increases in damage each year. Trees should be treated with Bordeaux mixture as soon as it appears. A spraying with strong lime sulphur solution when the tree is in dormant condition and gathering and burning the leaves and trash from underneath are good precautions against its reappearance.

POMEGRANATE

This very old fruit grows well in the Northern and Central portions of the State. The plant is naturally bushy, many shoots springing from the base; by keeping these removed and pruning up the plant a small vase-shaped tree may be formed, which with its scarlet flowers and brightly mottled fruit is both ornamental and useful.

The juice is useful in making jellies, marmalades and acid drinks. Papershell, Purple-seeded and Sweet are some desirable varieties.

California ships several car loads of pomegranates to eastern markets each year. There seems to be an opportunity open to us to do so also, as the insects and diseases attacking it are of minor importance and its cultivation and care are not difficult.

Discussion

Mr. Floyd: Mr. Soar, who is on this Committee, wrote me that he had nothing new to add to his report of last year and the year before. You are doubtless in possession of those reports.

Mr. Broome: I do not know much about growing the peach, but I am just starting. One point that was made in the paper interested me greatly. I practice a

little winter pruning and I find it stimulates the growth of the young wood. I find another thing, that while I knew I was pruning off some of the fruit buds, I did not realize I was pruning off practically all of the fruit buds that would stick. The shoots would push away the buds. I left a check, two trees in each variety, which I did not prune. They showed much less vigor in wood, but much more fruit. So the fruit I would have had this year, I pruned away.

Mr. Gillette: That was true, particularly of the Waldo, not so much of the Angel, and so far as the Jewel is concerned, the Jewel did not seem to show much tendency to bear this year.

In pruning back, I find there is a long, bare shoot that seems to keep alive for a long time, but the growth does not start. The shoots will start down below and grow vigorously but there is a great deal of wood that apparently is alive that will eventually die and it is being covered up by the shoots. This would have been obviated, doubtless, by summer pruning.

Mr. Floyd: There has been some very interesting work done by our Experiment Stations in the summer pruning of the peach. I was interested to find some of the recommending and working out a method of pruning the late bearing varieties. Most of our peaches in Florida that are of much value, are early, so we can prune after fruit ripens and stimulate growth before time for it to cease in the summer, but in the late bearing varieties, they find by careful examination that some branches bear one season much more heavily than another. There are branches scattered through the trees well developed that will have only a small quantity of fruit on them. Those branches are pruned severely during the summer. By this method they have come to make the tree develop wood; about half of it each season will put on fruit, the other half will be pruned to bear the next season. They have found in two experiment stations very favorable results obtained in this way. Thus not only in our early peach trees, but even in the later ones, by pruning the less fruitful branches, they get the same beneficial results.

It seems a very reasonable and desirable thing to do, that is, prune such branches as form their fruit buds before the summer, to stimulate the new growth and get the fruit buds developed before the next season.

Mr. ——: You mentioned, Prof. Floyd, the use of lime sulphur on the tree when not in a dormant condition, for brown rot. I am quite certain I have read, though I have had no experience, that the ordinary lime sulphur is destructive to the foliage of the peach. that the self-boiled lime sulphur alone can be used.

Mr. Floyd: Of course, some slight injury may result, but if it is made sufficiently weak, the benefit is greater than the injury.

STRAWBERRIES

A. A. Lewis, Kathleen, Fla.

Mr. President, Ladies and Gentlemen:

Strawberry growing has become quite an industry for the last few years in Florida, especially the southern portion, and fortunately for the grower, insect and fungi pest are not much known in this section. However, there are other problems that must be worked out in order to be successful. Some of these are peculiar to each locality, yet such as soil conditions, preparation, fertilization, varieties and harvesting are about the same in each section of South Florida.

SOILS AND PREPARATION

Without irrigation, low land, of which we have an abundance, is best; dark loam is preferable; gray sandy soil will produce good berries. These soils must be well drained. Allow no water to stand or log on your berry plot; keep plenty of humus in the soil by turning under vegetation. This will aid the action of your fertilizer and help to retain the moisture. Strawberries are fond of both.

FERTILIZER.

When possible use 4, or 5, or 5-6-10 formula, 800 or 1,000 pounds to the acre fifteen or twenty days before setting plants in rows slightly ridged, depending on condition of the land; however, under conditions that now exist we are compelled to do with less potash, so would recommend the liberal use of hardwood ashes in top dressing.

SETTING PLANTS

Two systems of setting are in practice, single and double rows. From 18,000 to 22,000 plants are required to the acre. Shallow and fast cultivation is necessary in order to conserve the moisture.

HARVESTING.

This is one of the important features of the strawberry industry. See that the berries are carefully picked with stem half an inch long and placed in the cup; do not allow pickers to hold berries in their hands while picking, as this will bruise the berries. Pack them so that the top layer will represent the contents of the entire cup. However, to grade your berries, make two grades; this will pay for the extra expense and trouble. Shipping both small and large berries together will show a loss as the small berries always govern the price.

CO-OPERATION

Organization is necessary before introducing the berry industry in a new section; large acreage is necessary in order that club shipments can be made, that is

where co-operation comes in as well as in many other features of the industry. Selling at your station is preferable if possible, and if this can not be done, then select reputable commission firms to ship to. No hard or set rules can be followed. These problems can often be worked out satisfactorily in each section.

Tropical Fruits

John B. Beach, W. Palm Beach

AVOCADO

Among tropical fruits the avocado is just now holding the front of the stage. While those we are most familiar with may be classed as tropical, there are many trees which endure temperature below freezing with impunity.

The avocado is divided into 3 classes or types. The West Indian which we will call class 1; the Guatemalan, Class 2; and the Mexican Class 3. To Class 1 belong practically all the familiar avocadoes now fruiting in Florida and the West Indies. Skin is generally rather thin and smooth, and the seed is often loose in the cavity, which makes them bad shippers, when this occurs. This is the type most susceptible to cold, and trees may be injured at temperatures below 30°, the amount of injury depending upon the size and condition of the tree, and the duration of the low temperature. As an actual fact there is a tree of this class 5 feet in diameter and 50 years old growing at Dunedin, Florida, and bearing enormous, regular crops of fruit. There are trees below Palatka on the St. Johns River which are bearing fruit, and in 1835 the records show that "Alligator Pears were killed at St. Augustine," which trees must have belonged to this class.

Class 2: Guatemalan type: These trees come originally from lofty tablelands of Central America, where the altitude renders the climate cold for that latitude and the trees will stand temperatures well below freezing. In California they have stood from 22 to 26 degrees Fahr. without injury, depending upon age and condition of the tree. It may be said that trees in bloom will stand 26° in safety and have been known to stand below 20° when dormant. The rind of this class is quite thick and generally rough, which is an advantage in shipping, and the seeds are generally tight, another advantage. Also a large majority have a winter and spring ripening season which makes them ideal market fruit, coming when the large crop of Class 1 from the West Indies are out of the way, and the weather cool enough for long distance shipping. They run generally smaller than the more tropical type, but average as rich in quality and flavor. Oil analysis runs from 12 per cent to 20 per cent in the above classes.

Class 3: Mexican: Originated in the table lands of Mexico, and is accustomed to more severe cold, usually ice and frost, sometimes snow, (which our army encountered last month at Queretaro in pursuit of the bandit Villa). It seems as if this class should be hardy all over

Florida, at any rate wherever citrus trees can be grown, and fruited. The fruit is generally smaller than either of the above, and the skin is thin and smooth, but the oil analysis runs high, averaging over 20 per cent, 33 per cent being recorded, and 25 per cent to 28 per cent not uncommon, rating it even above the olive in this respect. Different varieties come on at different seasons, and it seems as if by proper selection every settler in Florida could have ripe avocados in his own back yard every month in the year. It will probably not prove as good a shipping fruit as the other two groups. If eaten not quite mellow, it has a peculiar sassafras twang, something after the manner of a persimmon, and the foliage possesses the same peculiar odor.

Mr. Krome, of this committee, from Homestead has promised to give us a talk on this subject.

MANGO

The mango, the King of tropical Fruits, is in about the same class as the West Indian strain of the avocado in cold resisting power. A combination of peach and pineapple, with a distinctive flavor and aroma all its own, places this fruit at the head of the list of dessert fruits, while the avocado appears with the meat course, or as a salad, or eaten in soup. While the mango is a good shipper, its being strictly a summer fruit prevents its ever rivalling the orange for the general market, as it will have to compete all over our country with the native summer fruits, abundant and cheap in each locality. Fine fruits of the East Indian grafted varieties will always find ready sale at handsome prices, even if restricted to local markets, and everybody wants a few trees for home use. Being a summer fruit, and of tough foliage and sturdy growth it makes an ideal windbreak to plant on the outer row of an avocado grove, whose fruit we wish to prevent being whipped off by Autumn gales at which time the mango crop is over. Like citrus trees the mango is sensitive to too much organic nitrogen, and will become diseased and finally die if planted close to a stable or henroost, while the avocado delights in just such a location. This year a bloom in February has set some fruit on trees here and there which will mature in May or June, but at this writing all the trees seem to be universally loaded with a profuse, but late bloom, promising a record crop for July and August.

A dry spring always means a good mango crop, as it reduces the activity of the fungus which causes the young fruit to drop. Irrigation of the soil will assist the trees in developing a heavy crop of fruit, but we have not as yet discovered any effective means of subduing the ravages of the fungus when a rainy spell occurs at the blooming season. In India, the home of the mango, the tree blossoms, and usually matures its fruit, entirely, during the dry season when absolutely no rain falls.

PINEAPPLE

The pineapple is one of the strictly tropical fruits which is grown in considerable quantities for the northern markets. On the East Coast large fields stretch along the line of the railroad almost un-

broken for miles, but the acreage is not so great, nor the profits as large as 15 or 20 years ago, owing to competition from the West Indies. Still it is a profitable industry, about on a par with citrus growing. It also utilizes land too dry and poor for other purposes, and at the same time it will enable one to grow an avocado grove upon this same land, making the cost of the latter nominal, as the same culture and fertilizer makes the two. Some growers are now planting avocado groves upon old abandoned pineapple fields, where the nematode is so bad pines will no longer flourish. This soil may have been in pineapples 15 or 20 years or more, and the quantity of humus produced by the pineapple plants, leaves and roots, has improved the quality of the original soil greatly for general purposes. However, if these growers had planted their avocado trees at the same time they first planted out their pineapples, they would have made a bearing grove at much less expense. The pineapple plants shade the land, which is of the greatest benefit to the young avocado, and the organic fertilizers which the pineapple requires are identically the same that the avocado prefers. A disease which causes the roots to die and the foliage to turn red and dry up, was for many years called the "dry wilt" and it militated against replanting the same field a second time to pineapples, as was done with impunity in the earlier days of the industry. This has been found recently to be caused by a nematode or microscopic worm, and the Department of Agriculture recommends the application of cyanamid as a fertilizer obnoxious to it. In practice new land and healthy slips have so far been the only preventative. The Smooth Cayenne and all the various "fancy" varieties proved especially subject to the attacks of this insect, and were all consequently abandoned on the East Coast in favor of the hardier and more resistant Red Spanish. In the Orange belt about Orlando and Punta Gorda where sheds are employed as a frost protection, the Smooth Cayenne is still being grown successfully. It seems that they are free from this nematode. Mr. C. S. VanHouten writes from Orlando as follows:

"We have no dry wilt or blight, as we call it, to contend with at present. About twenty years ago we had a little but it was confined almost entirely to old garden spots and soil that had formerly been used for other purposes. I had very few plants thus affected and carefully removed and burned them as they made their appearance and the trouble soon disappeared. In fact we have practically no insects or diseases of any kind to contend with.

"For growing the Smooth Cayenne I prefer a good quality of moderately low, sandy land, but perfect drainage is very essential. This should be well plowed and harrowed and carefully prepared, as for a nice garden. Land is arranged in beds of convenient width with passage ways between the beds.

"In this section a lattice covering, high enough to pass under, that will afford one-half to one-third shade is used. The plants thrive better and produce much finer fruit when partially shielded from the hot summer sun. The shed also protects the plants from strong winds and occasional frosts in winter.

"The propagation is from suckers and

slips, which are simply sprouts from the fruiting plants. These are taken off when about fourteen to sixteen inches long. A few of the lower leaves are stripped off to allow the roots to start out. They are then set about three inches deep and eighteen by twenty-four inches apart in regular order.

"When preparing the beds it is well to plow in a little good cow manure as a starter. Some good commercial fertilizer, especially for growing pineapples, should be applied, two or three times before blooming, or a total of about one pound to a plant and well worked in the soil.

"Cultivation is with a scuffle hoe only, and the soil should be kept sufficiently well scuffled at all times to keep a crust from forming. With proper care and attention plants will mature fruit within fourteen to eighteen months.

"There are properly two crops of fruit during the year. The summer crop and the winter crop. The former comes on, in this section, usually about August first and the latter about November first. The winter crop frequently lasts until late in the spring, and there is usually some fruit to be had between crops.

"A special crate holding two layers of fruit and measuring 12"x20"x24" is used for shipping the pines, which are carefully packed with excelsior to keep them from bruising. Each crate holds about sixty pounds of fruit and the number of pines in a crate is regulated by the size of the fruit; the usual number being from ten to sixteen.

"The Smooth Cayenne Pineapple thus packed can be shipped in perfect condition, to the most distant parts of the country, at all times of the year."

Mr. Goodwin of Fort Pierce is present and ready to reply to any questions relative to this industry on the East Coast.

Punta Gorda, Fla., Apr. 22, 1916.

Mr. Jno. B. Beach,
West Palm Beach, Fla.

Dear Sir: By request of Mrs. Marian A. McAdow I have secured from Mr. B. A. Wachob who is one of the most experienced growers of pineapples here, the following data concerning their growth:

40 or more acres planted in DeSoto County, near here.

All Smooth Cayenne's. Cost $600. to $800. per acre to shed. Use about 6 tons of fertilizer to the acre, less since high cost. Set 12,000 to 13,000 plants to the acre. Yield about 10,000 pines to the acre. Sell for 16 to 18 cents the pine. Doubtful if irrigation would pay.

Yours very truly,
C. M. Carrier.

LIME

While a member of the citrus family, the Lime may just as properly be classed as a tropical fruit, as the avocado, for it will not endure as much cold as the Mexican type, by at least 10 degrees. It is almost as tender as the guava. Following is from the pen of W. N. Hull, Manager Florida Key Lime Association:

"The Florida Key lime holds the same position in the lime business that the Indian River orange does in the orange game. The peculiar combination of the soil and the climatical conditions on the Keys, are ideal for the production of this high grade fruit.

"The industry is in its infancy and there is still much to be learned.

"In planting the best practice seems to be, spacing twenty by twenty feet squares; although very satisfactory results are obtained as close as twelve by twelve. But I have grave doubts but that as the trees grow older, this advantage gained in the beginning will be lost.

"The industry in the United States is too young to have any statistics published on it as yet. However, the British Government furnish these statistics on their West Indian Islands, where the conditions are practically the same as on the Keys. Their average yield is 112 barrels per acre per year.

"Lime trees under ordinary favorable conditions, bear profitably at 4 years of age.

"One and two year seedling trees are used exclusively for planting. It is very uncertain when young trees will commence bearing. In a plot of one hundred trees, all apparently the same in every respect, eight or ten will have a crop and the balance none. This peculiarity, however, disappears as the trees grow older.

"A grove is supposed to be in full bearing at about nine years of age, and should average about one barrel of limes per tree per year. There should be a noticeable increase in the amount of fruit for a number of years after the tree gets in full bearing.

"Prices range from $3.50 to $20.00 a barrel F. O. B. Miami. The average price for 1913 (before the war) was $13.38. Average price for the past ten years is $8.36.

"Planted on the entire Keys there are probably about 1500 acres of lime trees. 80 per cent of these are young plantings.

"The season runs from June to November, although a few limes can be obtained at any time. They require no fertilizer and early semi-cultivation.

"The standard pack is in flour barrels and orange boxes. The practice followed in the past was to pick all the limes, both large and small, in buckets, dump them in a barrel, cover with a burlap top and ship.

"The Florida Key Lime Association, organized last year, have invented an electric grading machine, which automatically separates the limes into their respective sizes, culling out the little limes entirely, and the fancy limes are selected and wrapped in tissue paper wrappers and shipped exclusively in orange boxes. We are positive that the prospects of this improved method of packing will eventually come into its own, and completely change the present barrel pack.

"The demand for limes even now exceeds the supply and the popularity of the fruit is rapidly increasing.

"The British Government statistics show that the exports to the United States in 1894 were 88 barrels. The United States Customs report for the year 1915 shows an import of 60.000 barrels."

It may be said in this connection that the Lime is eminently adapted for planting on the sandy soil of South Florida, wherever the guava flourishes. The seedlings thrive in the poorest soil, endure the greatest amount of neglect and make an excellent hedge to plant around the grove for a windbreak, as they stand wind well. They do not grow so tall as the mango, and it would be a good plan

to place one row outside the mango row around your avocado grove, to reinforce the windbreak, breaking joints with the mango trees, but planting the limes much closer together. Upon the high, deep sandy lands on the main peninsula the Key Lime seedling produces a much larger fruit than on the rocky Keys, makes a larger tree and fruits more continuously.

I have a tree 20 years old from the seed on spruce pine sand, exposed to the full sweep of the ocean winds across Lake Worth, which produces an average of 2 dozen fruits per day the year around. There has not been a day in the past 5 or 6 years, except just after a severe windstorm, that at least 2 dozen ripe fruit could not be found upon or beneath the tree. It bore at 4 years old, and for first 10 years had a main summer and fall crop, and a lighter winter and spring crop, gradually becoming absolutely everbearing. Withertip seems the only enemy of the lime worth mentioning, that is of the seedling lime, and this seems to yield readily to Bordeaux. Every fruit grower in South Florida should have seedling lime hedges, combining a good windbreak with a most profitable fruit producer.

The tropical fruits mentioned in this report are the few which at present stand at the front for commercial purposes and long-distance shipping. Beyond this is a long list of fruits of almost equal value and some which may in time equal these for commercial purposes. The great Anona family is only awaiting development to furnish us with a fruit having the quality of the Peruvian Cherimoya, and the shipping possibilities of the mango (which latter, by the way, has long been shipped from Bombay to London). It is only a matter of time before we will have this fruit ready for our orchards as a result of the hybridization being carried on extensively by the Department of Agriculture. The guava is unsurpassed as a jelly fruit, and invaluable for the home table. The Surinam cherry, coming in March and April, gives us a most delicious treat when fruit is rather scarce. The banana at our door, ripening, like the cocoanut, all the year around, supplies the home table with a welcome variety; yet neither of these are likely to become competitors with the West Indian products in the markets of the country for many years to come. All these should be planted by the home maker in peninsular Florida for home use and local market, as well as a host of others. For the past 11 years we have been free from severe freeze, and where people have ventured they have found that the tropical fruit trees could be grown much farther north than was formerly supposed, provided a little care was taken the first year or two to protect the young trees from frost. As the trees attain age and size they are able to withstand more and more cold each year, until we reach the 50-year-old avocado at Dunedin, with its 5 feet diameter of trunk, which had the strength and endurance to pass through the freezes of 94 and 95 and live to continue productive. Mother Nature has provided us with an ever present source of protection from our enemy Jack Frost, in her own maternal bosom. No matter how low the temperature should fall a sufficient depth of earth banked around the trunk of a tree or bush will save it from freezing. So that in case one has a number of bearing trees of a tropical nature and another

freeze like 1894 should come rolling down on us, a few shovelfulls of earth banked hastily up around the trunk will surely save that tree from destruction. After the danger is over, should the entire tree have been frozen above the protecting embankment, all that is necessary is to saw it off below the damaged portion, and in 3 years at the most, generally in two, your tree is grown up and producing fruits again as if nothing had happened. Of course this will not apply to cocoanuts or pineapples.

THE GUATEMALAN AVOCADO

W. J. Krome

Mr. President, Ladies and Gentlemen:

The subject which has been assigned to me by the Chairman of the Committee on Tropical Fruits, as a part of this morning's program, is one which gives me a two-fold pleasure to present to the members of this Society.

In the first place, I am glad to have the opportunity of disabusing you of the impression which you may have quite reasonably formed, that there is only one horticultural subject upon which I have any information which might be of interest to you. At the past several large gatherings of the growers of this state, the last annual meeting of this Society and the sessions of the Citrus Seminar, it has been my unpleasant allotment to tell you of the dire things which have been threatening the citrus industry through the ravages of citrus canker, and I am certain none of you can be more thankful than I that the situation in respect to the disease at the present time is such that it is not necessary for me to serve a purpose akin to that of a human fire alarm.

In the second place it is always a pleasure to introduce to congenial company, a new comer who has every intention of becoming a permanent resident of the community and who gives promise of being amply able and willing to contribute a full share towards the public welfare. In bringing to your attention the cultivation of the Guatemalan Avocado, I believe, I have the honor of making to the members of this Society, the first formal introduction of a fruit which is destined to very shortly play an important part in the horticultural development of our state.

The propagation of the Guatemalan type of avocado was first taken up in a small way in Florida some six or seven years ago when a few seedling trees were planted at the Subtropical Gardens in Miami by the Bureau of Plant Industry. It seems apparent that no very great importance was attached to this matter either by the officials of the Bureau or by any of those locally interested in the growing of avocados, and it was not until two years ago, when a few of these seedling trees first bore fruit, that any serious attention was given to the new introduction. Even then the first impression of those who examined the fruit was practi-

cally unanimous that there was very little of interest in it to the Florida grower. It was much smaller than the West Indian varieties to which we were accustomed, it had an exceedingly rough, corrugated exterior and on the whole its appearance was quite unattractive.

However, more extended observation impressed upon those most interested the fact that this new type had certain distinct advantages that were worthy of careful consideration. The trees had shown themselves to be more vigorous growers than those of the West Indian type previously cultivated. The flesh of the fruit instead of being incased in a thin skin, easily damaged in handling, had as an exterior covering a shell considerably resembling that of an ordinary gourd. What this might mean in the way of improved shipping qualities seemed obvious. The fruit matured during the late winter and spring after all avocadoes of the West Indian type had disappeared from the markets.

Later on we began to find that the Guatemalan varieties promised to be prolific bearers under Florida conditions and that the eating qualities of the fruit were equal to the best that we had been previously growing and in the opinion of many were superior to anything which we had been able to produce. It was also found that most varieties of the Guatemalans propagated readily either on Guatemalan or West Indian stocks.

Now I am aware that heretofore the subject of avocado culture has been one that directly interested only the comparatively small proportion of the membership of this Society who reside in the most southerly sections of the state. But unless all that we can learn of these Guatemalan types is in error, this is not going to be much longer the case. Most of the varieties which have been imported from Guatemala and Southern Mexico are grown at elevations from four thousand to six thousand feet above sea level where they must withstand a degree of cold considerably lower than that which is at all liable to occur anywhere within the boundaries of Florida. If the trees grown under our climatic conditions and at our lower elevation prove themselves equally resistant to cold as in their native environment, the field for the development of this industry will be spread over an area ten times as great as that in which the West Indian varieties can be safely grown.

Summed up the Guatemalan Avocado has shown the following characteristics which recommend it for the consideration of Florida growers:

Vigorous tree growth, regular and prolific bearing, a late season for maturing its fruit, fine shipping qualities, resistance to cold, and exceptional value as a food product.

Those of us who have become enthusiastic over the possibilities of this new type of fruit are even able to find a degree of attraction in the very lack of exterior beauty which we at first disliked, much as one may grow to appreciate the rugged physiognomy of an human acquaintance just on account of its extreme homeliness.

Now speaking in a somewhat more general way as to the development of the avocado industry over a large area of this state, the question most frequently asked probably is, "What are the chances of over-production?" The answer to this at present depends considerably on one's

individual opinion. Personally, I believe we have very little to fear in that line for many years to come and I have several reasons for this opinion. In the first place the planting of budded varieties will progress for some time at a comparatively slow rate on account of the scarcity of trees of this class. In the second place the avocado has basis for a claim upon the consuming public which no other fruit or vegetable has to the same degree. I refer to its value as a food product.

Analyses of a large number of varieties of avocados have shown that the edible portion of the fruit contains from a minimum of 10 per cent to a maximum of nearly 30 per cent of fat, which is higher than that of any other fruit or vegetable offered as a food product and is approached only by the olive. From the standpoint of energy-producing value, as measured in calories, the avocado ranks in the same class as wheat bread and lean beef and is only surpassed by a few such products as sugar, cheese and butter.

The time will of course come, and probably for the benefit of the industry, it will be better if it comes soon, when the avocado will no longer command exorbitant prices as a delicacy to be indulged in only by the wealthy epicure. But with the more general distribution of the fruit and the realization of its food value which must inevitably come in this country, as it has long ago come to the people of the countries directly to the south of us, there is every reason to believe that the avocado will find a place among our food products which will enable the Florida horticulturist to embark upon this industry with every prospect for continued reasonable profits.

I have been requested to give in detail a method of top working seedling avocado trees which we have developed at Medora Grove at Homestead during the past five or six years, but our program this morning is crowded and with the permission of our President I will prepare a description of this method and have it included in the proceedings for this year where it will be available for any who may wish to make use of it.

I thank you for your attention.

THE MEDORA METHOD OF TOP-WORKING AVOCADOS

Before an avocado tree is to be cut back for top-working it is of considerable advantage to bring it to a stage of incipient growth by an application of fertilizer containing a fair percentage of nitrate of soda, put on about a week previous to the time the top-working is to be done.

Trees of nearly any age may be successfully worked, but when the seedling is from three to five years old, results are the most satisfactory.

The main trunk of the tree is cut back at a height of from one to three feet above the ground and any limbs below the level of the cutting are allowed to remain. In the case of forked trees both trunks are cut back and top-worked and in the event of the grafts living in only one prong, the other is cut off close at the union and the tree developed from the single remaining trunk.

The wood of the avocado does not split cleanly and the cleft for the insertion of the scions is best made by making a verti-

cal saw cut extending across the full diameter of the trunk and having a depth of about five inches. A cut of this kind does not give sufficient clamping effect as a rule, and it is usually necessary to insert a hardwood wedge at the center of the tree and drive it down until a slight cracking has been produced at the lowest point of the saw cut. The hard-wood wedge is then withdrawn and is replaced by a wedge made from some portion of the upper section of the tree previously removed. This wedge is driven home sufficiently to open the cleft enough to permit of trimming the edges of the saw cut with a very sharp knife. This latter operation must be done with considerable care as it is essential that these edges be true and flat.

The scions used depend somewhat on the size of the trunk which is being worked but should be from trees of known bearing qualities and perferably from trees in a nearly dormant state. The wood from which the scions are cut should be of either the second or third growth back from the last flush, the bark should be green but not tender enough to bruise easily, and there should be, near one end several eyes or buds which have not begun to open a growth. If the scion may be cut so as to have at one end a whorl of buds such as is usually found at the point of demarcation between two stages of growth, so much the better. Scions containing a number of "blind" eyes should be discarded.

These scions should be cut to have lengths of from seven to nine inches, and should be shaped so that the portion inserted in the cleft in the trunk is a long, cleanly tapered wedge fitting neatly and extending to nearly the bottom of the saw cut. The trimming of these scions is equally as important as the proper preparation of the edges of the saw cut. This is work for a razor-edged knife, carefully handled to prevent "wavey" surfaces. The wedge shaped portion of the scion should be slightly bevelled towards the inner edge to conform with the decreased diameter of the trunk. From three to five inches of the scion should remain of full diameter projecting above the level to which the trunk has been cut.

A graft should be inserted on each side of the cleft in the trunk and the wedge firmly held in place but not subject to sufficient pressure to crush or bruise the wood. The wedge should then be cut off smooth with the horizontal surface of the trunk, the lower end remaining in the cleft. While loosening the wedge the scions must be carefully adjusted so that the cambium layers of trunk and scion join. The open portion of the cleft between the two grafts, not taken up by the end of the wedge, must now be fllled with grafting wax and any part of the cleft extending below the bottom of the scion must be made water tight in the same manner.

The whole upper end of the trunk is then wound with waxed cloth, using strips about two-and-one-half inches wide and wrapping tightly from below the bottom of the cleft to the upper surface of the trunk. These wrappings should be brought over the upper surface of the trunk and around the juncture of the stock and scions until the whole has been sealed water tight and the resultant work looks very much like a surgeon's job of binding up the end of on amputated

limb. The exposed ends of the scions should also be sealed at the tips with a drop or two of soft wax.

Around the upper end of the trunk, and extending for several inches above the top of the scions a collar of heavy paper is wrapped, held in place by firm tying around the trunk. Ordinary builder's paper is very good for this purpose but roofing paper or other material containing tar or asphaltum should not be used. The cup thus formed above the trunk is then filled with clean dry sand to within about an inch of the top of the scions. This prevents drying out and apparently serves to preserve the scion until a union with the stock has formed. The portion of the collar extending above the top of the grafts acts as a shade.

Under ordinary conditions the graft will begin to put out growth within from two to three weeks but it is not unusual for a period of from four to six weeks to elapse before the eyes spring. Growth is very rapid after once commenced and care should be taken in supporting the new top as heavy winds are liable to break the graft from the cleft. Stakes driven alongside the trunk or lathes lightly nailed on will serve this purpose.

Top-working by this method of cleft grafting may be carried on from the early part of November until the end of February but much the best results have been obtained when the work was done during the latter part of November and first half of December.

Grafting at this earlier date also has the advantage of giving the operator a double chance of securing the desired results, as in case of failure of the grafts, the trunk will usually put out a strong growth of new shoots which are in admirable condition for budding during February.

At Medora Grove, top-working of this description gave successful results during the past season with about eighty per cent of the West Indian seedlings worked to the Trapp variety and with about ninety per cent of the trees worked to Guatemalas. The stock ranged from four to twelve years in age, some of the latter having trunks nine inches in diameter at the height where cut back.

The exposed surface of the stock should be kept sealed water tight with liquid wax until the graft has completely grown over, which will vary from one to four years depending on the size of the trunk.

Grafted trees will in many instances bloom and set some fruit the next year after top working and in a very large percentage of cases will bear heavily the second year.

R. L. Goodwin

Seventeen years ago I came to Florida and located at Fort Pierce on the Indian River. I started to grow pineapples. The first year or two I thought I had learned all about pineapples, but as time has gone on, I have discovered that I have learned less and less.

My trip to this portion of the country and Punta Gorda, has been an eye-opener to me. Had I visited here fifteen years ago, I am satisfied I could have made at least $25,000 more than what I have accumulated at the present time. I have learned something in the past week, some-

thing that will be valuable to me and others who intend to go in the pineapple business, as I am hungering for information, and I want to be of service to my fellow man, and I want to give them as much information as I possibly can to help them.

On the East Coast, the principal variety grown is the Red Spanish. The Red Spanish grows on high sandy soil and does well; poor soil, apparently, but if planted on low, moist, rich land, they will not do well. The Red Spanish variety is specially adapted to high, dry soil.

The Smooth Cayenne will stand a great deal of abuse. It does well on strong, heavy, fertile soil, and it will stand considerable moisture. It will stand its feet in water for a short time and recover and do well, but well drained sand is preferable.

There is considerable difference in the east and the west coast in their methods of growing pineapples.

I visited Punta Gorda and discovered the variety grown there is the Smooth Cayenne. Sheds cost them about $850.00 per acre. We used to grow Red Spanish under sheds, which cost us about $400.00 or $450.00 per acre, but we now grow them in the open. The difference in the sheds, is, we used light wood posts for supports and cypress laths strung together on wires overhead. The laths are three inches wide used on the sheds here, they are long and nailed fast to the stringers, supported by posts six by six.

The Smooth Cayenne pineapples are grown on ridges. The land is generally low and the ground is thrown up so that it will have good drainage and so that the pines will not have their feet in water long at a time.

On the East Coast, we plant all the pines on the flat.

The most wonderful thing to me at Punta Gorda was the fertilizer proposition. I visited one grower, and he told me he used about three tons in one year to the acre. I said, "I will have to take off my hat to you, because in my neighborhood I am considered a heavy fertilizer and the most I have ever put on is two tons per acre." I visited another, and he said he used between five and six tons. I said, "Well, I will take off my hat and keep it off until I leave Punta Gorda."

He further told me when he planted the young pines, he gave each plant a pound of fertilizer. We growers on the East Coast drop in a tablespoonful of cottonseed meal and tobacco. The fertilizer I use is known as the Gem Pineapple Manure manufactured by the E. O. Painter Fertilizer Company. The Punta Gorda growers used the same.

The sources we use are from organic materials. We find as a rule that the nitrate of soda, sulphate of ammonia, can be used with care. Use the sulphate of potash (the low grade) as a source of potash, for I believe the low grade makes the plants more frost resisting.

The real estate men say the reason we use sheds on the East Coast is to shade the plants from the sun, but the real reason for our using sheds over pineapples is to protect them from frost. (Laughter.) It is true, also, that sheds protect the fruit from sunburn.

There is no excuse for people who live in Florida to be without pineapples, because they will grow almost anywhere.

You may grow your own pineapples anywhere in the State of Florida, if you can keep Jack Frost from getting them in the winter, and their feet out of water. If you live in the northern part of the State, take out a bundle of hay in November and put on top of them, then in the spring take your hay off and in two years from the time you plant your slips or suckers, you should harvest a crop.

I find that freight rates on the East Coast of Florida are higher than they are on the west coast. I can not understand why. It looks like discrimination. The rate from Punta Gorda to Jacksonville, and the distance is greater than from Fort Pierce, is 5c less per crate. By express it is 5c less per crate. From Tampa to Jacksonville the rate on a carload of citrus fruit is about $15.00 less than it is from Ft. Pierce, and the distance is less from Fort Pierce.

I would like to call the attention of the Florida Growers and Shippers League to this, and if they can obtain fair freight rates for the East Coast growers, they will certainly accomplish a great good.

I find that the average life of the Smooth Cayenne on the West Coast is four to five years. One grower told me he was going to let them bear two years and then hoe them off.

I have a field from which I have taken the twenty-third crop.

The largest sizes of the Red Spanish run eighteen and twenty-four to the crate. By using six tons of fertilizer to the acre, it would seem to me that twenty-four ought to fill a barrel. (Laughter.)

On the East Coast we grow the Red Spanish and the Abbaka. The Abbaka is a long pineapple and golden yellow when ripe. It ripens from the inside and is a sweet pineapple, free from tartness and can be served like grapefruit. The Red Spanish produces slips which grow very long and those are the plants we use for propagating. There are very few slips on the Smooth Cayenne and we use the suckers. They bear in one year's time. I have planted suckers in the past and the fruit produced the first year would be very small; we did not consider it advisable to let it grow and broke the blossom off to prevent it from fruiting, but I think now, by applying large quantities of fertilizer, we could have increased the size of the fruit.

I think there is a question in the question box, which asks how often pineapples should be fertilized, and if it is harmful to fertilize when the plants are in bloom.

Pineapples should be fertilized any time they need it, whether they are in bloom or not. It is inadvisable to fertilize in the heart of the plant, if your fertilizer contains nitrate of soda. Nitrate of soda in a mixture should always be applied to the ground. Any pineapple mixture that is put up by reliable manufacturers, is a good fertilizer to use. Cottonseed meal and tobacco dust, blood and bone of the various qualities, high and low grade and sulphate of potash if you can get it, a mixture containing not over 6 per cent of potash is advisable to use at any time. I use a balanced fertilizer to drop in the heart of the plant when first planted to prevent sanding.

Somebody asked the question yesterday how to keep the sand from getting into the heart of the plant. In a beating rain, if the sand jumps into the heart of the plant, the fertilizer and the sand form a

cement plug, which is pushed out as the spine develops. If the fertilizer has not been put in the heart of the plant and sand gets in, the best way to get it out is to take a bucket in one hand and a tin dipper in the other, and pour water from a height in the heart of the plant and wash it out. In hoeing with a scuffle hoe, draw the sand away from the shoot, to allow the sand to fall from the leaves.

Mr. ——: How can you tell when pineapples need fertilizer?

Mr. Goodwin: Generally from the color. Pineapples when thrifty and well fertilized, are usually of a dark green color. When they are yellow and light colored, they need fertilizer, and especially ammoniates.

Mr. ——: What variety would you prefer to plant for home use, on average high pine land, well drained?

Mr. Goodwin: I would advise you to get a few slips and plants of every variety you can get. The Red Spanish is the most distinctive in flavor, but the fruit is of average size. I would certainly try some of the Smooth Cayennes and some of the Abbakas. I have tried the Queen, but it has become unpopular on account of its poor carrying qualities, but it is delicious for home use, and I would advise your trying some of them. We growers on the East Coast think the Red Spanish is the best we ever have grown. We think *that* is the apple that Eve gave to Adam. (Laughter.)

Mr. Dimmick: You referred to the difference in freight rates on the East and West Coast, which I know to be a fact. Speaking about correcting it, I want to ask if it is not the duty of our Railroad Commission to correct it. And I want to say right here, that our Railroad Commission is the most expensive luxury we are carrying on.

Mr. Goodwin: I would like to refer that to our Growers and Shippers League, that is the association formed for the purpose of taking up our freight matters. I think the matter should be taken up through them.

Mr. ——: I would like to ask about the Pernambuco.

Mr. Goodwin: That is a variety I have never seen.

Mr. Beach: It was brought over from Pernambuco a few years ago by old Jack Potter. Its culture is confined to the neighborhood of Lake Worth. It is fit only for home use. It is not very large; it runs less than two pounds to the average, but is as full of juice as a watermelon. You eat it with a spoon, and after you have taken all the pulp you can squeeze half a tumblerful out of the rind, just as you would a lemon.

Mr. Hart: To me that is the most delicious of any I have ever tasted in the pineapple line. You can bite right into the side of it and eat it as you would an apple and not get any of the biting quality. I know they are small, but for home use it seems to me they are worthy of a great deal of attention.

Report of Legislative Committee

Mr. Hume: I am going to ask Mr. D. C. Gillette to tell you about some of the work that has been done about securing an appropriation. As I intimated yesterday, Mr. Gillette has performed a very large public service in this work, and while it was done by a committee which was not appointed by this Society, yet that work is one in which we are deeply interested.

Mr. D. C. Gillette: After the pleasing and beautiful entertainment that has been furnished tonight, I hesitate to impose upon this audience to discuss shop. Those of you who have heard me before, know that I am not an orator; those who are about to hear me for the first time will soon find that out. I promise not to detain you more than two hours.

As many of this audience know, last October at the seminar in Gainesville, a committee was appointed composed of Mr. Skinner, Mr. Jones, Mr. McClure, Mr. Ingram and the speaker, charged with the responsibility of presenting our sad plight to Congress in the hope that we might secure a Federal appropriation of a sufficient sum of money to continue the work that had been inaugurated by the growers, later taken up by the State.

At that time the funds of the State would soon be exhausted and unless we secured the aid that was needed from Washington, all that we had done in the past would have been lost.

In order to make this a national issue, and one which Congress would officially recognize, we had to tie in more than the State of Florida. This disease was prevalent in Texas, Louisiana, Mississippi and Alabama. We at once began to organize those states into a citrus canker committee similar to our own, and at Mobile we held a meeting, at which representatives from each of the five states were present, and as the outcome of that meeting we tied in the five states in a resolution to present the matter when Congress opened, looking for relief in the form of an appropriation.

We organized those four states in three weeks, and in the first five weeks we mailed out of the Tampa office, more than 150,000 letters and 50,000 booklets.

The committee takes small credit to itself for the results. The great co-operative spirit, which has predominated throughout the entire campaign, is that to which we attribute our success.

I thought several weeks ago I ought to get out a letter to quite a lot of people, and I figured out I would want about 10,000 letters to those whom I should especially thank, and so I concluded it would be best to wait until our work is finished.

At the present time we have $300,000 that is being expended, as our able Plant Commissioner informed us, as rapidly as he can. We also have $250,000 in the Agricultural Bill which has passed the House. That Bill is to be in the Senate next week, and there is an amendment pending in the Senate of an additional

$250,000 which, if our plans do not miscarry, will give us in the Agricultural Appropriation Bill $500,000, making a total of $800,000 out of this session of Congress. (Applause.)

That money is in the hands of the Department of Agriculture and is being expended under its direction, in conjunction with the State Plant Board. We are in this position; the government has officially recognized citrus canker. In December we had 278 members of the House absolutely pledged over their own signature to vote for an appropriation for citrus canker. In the Senate we had more than seventy. There was not, of course, any previous legislation to justify the item in the Urgent Deficiency Bill, nor previous legislation to justify the item in the Agricultural Bill, and had this been a matter of majority vote we would not have been in a position that might have dangerous, but in both of these bills the item has been subject to point of order; any one member of the House could have thrown it out, so it had to be a unanimous vote rather than a majority. However, they have recognized the item and in the future we will not have this difficulty.

The Secretary of Agriculture hesitated about approving this large plan we presented to him, and very properly, for he is the official "bumper," and he is there for that purpose.

We went to Washington on the basis of what the Government had done for the foot and mouth disease. We presented it on the ground that we were entitled to recognition in the eradication of this disease, just as the owners of live stock were, in the North and West. We found out, though, that the basic laws on which the Bureau of Animal Industry were founded, provided for eradication and destruction of property on the basis that some diseases that were common among animals, were communicable to human beings, and the basic laws of the Bureau of Plant Industry did not provide for anything but the collection of information and its dissemination to the people of this country.

This is the first time in the history of the government that the Bureau of Plant Industry has ever undertaken the eradication of any plant disease. The Honorable Secretary reminded us that if the bars of the Treasury were let down, for the eradication of citrus canker, there was boll weevil and all those other diseases and dangerous pests prevalent in other states of the country, and he wanted Congress to define the policy of that Bureau and whether they were going to authorize such matters to be handled. You can imagine, with that looking us in the face, we did not feel very hopeful.

However, apparently these difficulties were overcome and we are enjoying now a part of the $300,000 appropriation, and when that is exhausted I hope we will get into the other $500,000. He makes the statement there is no body of men who can accurately determine the amount of money it will take to eradicate this disease. He states he has enough money appropriated to take care of the disease until another appropriation bill can come before Congress, and by that time he hopes to know more about the cost of eradication, though he feels it will cost $4,000,000 at least, distributed over a period of

about four years. Those figures, and ours, agree.

Now, there is a matter I want to bring before this body, and that is this; in all work of this kind, the government has required the states to participate on an even basis. The first question that was asked us was, "What has Florida done?" and we were proud to be able to say she had appropriated the money we received from her last Legislature, and but for that we would not have been anywhere in our fight. (Applause.)

The money that is now being expended I do not believe is going to be cut short, but I do believe when our next Legislature convenes a year from this month, that the Department of Agriculture is going to prescribe certain requirements of the State of Florida, and very properly, and I hope that the State of Florida will meet her obligations without any difficulty.

The opportunity is at hand right now for the citrus growers of this State to get that appropriation; that is, prior to these elections that are coming soon. If every citrus grower in Florida would sound out the different candidates, and there are many, on the subject of appropriation, it is very easy at this time to mould the sentiment that later might not be so easy.

The Citrus Canker Committee was appointed by the Seminar, and we do not know to whom we are to report. We feel that our Federal work is over and we would like to report and be discharged.

I took it upon myself recently to address a letter to the four candidates for Governor and asked them to answer this question, yes or no—will you, if the successful candidate, include in your message and actively work for the eradication of citrus canker by such sum as in the judgment of the State Plant Board may be needed, not exceeding $500,000? I have in writng, from each of the gentlemen, that they will support such measure. (Applause.)

It is just as easy to secure the other pledges from the members of the Lower House and the Senate, if we go for it now. I do not believe there is a man in the State of Florida, a voter, who does not recognize an obligation that devolves upon the State to support its chief industry within the State, and they must know that while the other states to the west are geting a part of this appropriation, still the citrus industry to them is very small and unimportant.

I want to say just one word more, and that is in all of our hearings and wherever this committee has needed any assistance, there is a man in the State I have called my pinch hitter, and that is our Plant Commissioner, Mr. Newell. I regard him as just as necessary to the citrus canker as this appropriation or any other, and I sincerely hope that long after our money is gone, we still will have him with us. (Applause.)

I also want to say another word, though I do not want to inject politics into this meeting, but I do want to speak of the splendid co-operation and support and hard work of Florida's delegation in Washington. (Applause.) They were "on the job" at all times and actively on the firing line in the work with these committees. And more particularly do I want to refer to the dean of the Florida delega-

tion and the man who was named as chairman of the Florida delegation to handle this matter in Washington, Honorable Stephen M. Sparkman. (Applause.)

I understand he returned this morning to Tampa. The Agricultural Bill did not pass the House until within the last forty-eight hours. He remained there to know that the entire Bill would gothrough without any change. He has been in Washington ever since he returned after the Christmas holidays and he has been the leader in this fight, and his position in the House of Representatives as Chairman of the River and Harbor Committee places him where few other members could have been, and I attribute to him much of the success of the real work in the House. I feel as though every citrus grower in Florida, especially in the district he represents, ought to know that, and act accordingly.

I thank you very much for your kind attention. (Applause.)

I am requested to state that I am not able to render report of our receipts and disbursements for at least another month.

Mr. M. E. Gillette: Mr. Tenney, a member of the committee, will offer a resolution, and I hold in my hand a resolution which I propose to offer. You have just listened to a discussion of the citrus canker matter by their big chairman on the citrus canker committee—I don't know what his name is, but I want to say that he has been very unfair; he has stolen all of my thunder, but as it is all in the family I will not argue about it.

I presume there is no single thing that the citrus growers have thought so much of, have read and heard so much about during the past year, as citrus canker, and to those of us who know what it means to the citrus grower and the citrus industry, I think this resolution will apply.

The chairman of the committee told you just what I am going to ask you to do in this resolution. It is a whole lot easier to get a man's idea and get him to agree to do something before he is elected to office than it is after. This year happens to be one of those in which a great many of our citzens seem perfectly willing to sacrifice themselves on the political altar, and they are going to ask us to put them up there to make new laws or revise the old ones. I believe it is incumbent on us as voters to ask them what they propose to do for us. They ask us to vote for them; let's find out what they are going to do. This resolution will, I think, make it very plain what they are expected to do.

WHEREAS, the members of the Florida State Horticultural Society are vitally interested in the welfare of the Citrus Industry, many of them directly by reason of their grove holdings and others indirectly by reason of the importance of the industry, in the developments and prosperity of Florida, and

WHEREAS, in the raising of funds for the eradication of citrus canker by public subscription, in the work of securing the enactment by the Florida Legislature of the law creating a State Plant Board and the measure appropriating $125,000.00 for the fight on citrus canker and in the campaign to secure aid from the Federal Government for the further prosecution of the canker eradication work,

the members of this Society have taken an active and influential part and

WHEREAS, it is now certain that no living man or group of men can accurately estimate the cost of carrying to a final conclusion this citrus canker eradication work or definitely determine the period of its duration and it is exceedingly probable that funds in addition to those now available will be required to complete the conquest of the disease, and

WHEREAS, the State of Florida not only is required by the interests of her most important single industry to stand behind the fight on citrus canker until it has been finally won, but also is under a moral obligation to do so in order to justify the Federal Government for the aid it has given and in extending further help as may be asked for, now, therefore, be it

Resolved, by the Florida State Horticultural Society in annual convention assembled at Arcadia, on April 26, 1916, that we regard it as incumbent on the next session of the State Legislature (provided citrus canker has not been eradicated), to appropriate such additional sums for citrus canker eradication as in the judgment of the State Plant Board may be necessaryand we as individual members of the Society pledge ourselves to request from all candidates for members of the House of Representatives and State Senate in our respective counties and districts pledges to support such appropriation, and be it further

Resolved, that a committee of this Society be appointed and charged with the duty not only of securing a record of such pledges from candidates and notifying each member of this Society of same prior to the Primaries and General Election, but also of bringing before the next session of the State Legislature bills for the appropriation that may be needed in the further handling of the citrus canker eradication effort, and of taking all proper steps to secure their adoption.

Resolution adopted.

Mr. Robinson: It may be superfluous to make this a motion, but it occurs to me that as some of the members of the successful citrus canker committee are members of this Society, it would not be out of order that the committee be made the committee of this Society as well as the citrus Seminar, to carry on this work.

Mr. M. E. Gillette: I think that is a very sensible suggestion. The members of that committee are, of course, more familiar with the work, having had it in hand for a year, than any other member of this Society.

You heard the statement of the chairman that he had already written the candidates for Governor and received favorable replies. I think it proper that the balance of the report should be laid on that committee, and that as soon as they get a response, every member of the Society should be notified.

I would suggest that the Chair appoint it.

Mr. Hume: That will be the quickest way to dispose of it; I will then appoint the Citrus Canker Committee which has been handling the recent Congressional measure for Florida, the committee of this Society. (Applause.)

Mr. Tenney: Mr. Chairman, those of

us who have been more closely associated with the demonstration work under the Plant Act, have been impressed with one thing, namely, that the only appropriation carried in the Act itself is not going to be sufficient to carry the demonstration work of the Plant Board as it should be carried in order to properly protect our interest. When the sum of $35,000 was suggested, and when we went to Tallahassee to ask for that sum, we thought it would be ample, but the development of the work has been so rapid and the fields of endeavor have broadened so widely that that sum is really not over fifty per cent of what we need to carry out our ordinary work that comes under the scope of the Plant Act. This, you understand, is entirely aside from the citrus canker work that we hope is more or less temporary, and is an annual appropriation that will go on indefinitely. Therefore, in order to meet the situation, we present the following resolution:

WHEREAS, The Florida Plant Act of 1915 is a law of unestimable value to the agricultural interests of the State, and

WHEREAS, it is very essential that the nursery inspection work, the Port Inspection work and the other departments of the administrative work be supplied with sufficient funds to protect the interests of the State properly, and

WHEREAS, the present annual State appropriation of $35,000 will not furnish sufficient funds to do this, therefore be it

Resolved, that the Florida State Horticultural Society, assembled in annual session, recommend to the State Plant Board that in their estimate to be prepared for and presented to the next session of our State Legislature, they increase the amount estimated for the administration of the Plant Act to a sum sufficient to carry out the provisions of this Law in a way that will fully protect the agricultural and horticultural interests of the State. Be it further

Resolved, that the Executive Committee of this Society take such measures as it may deem advisable to secure an amendment to the Plant Act that will conform to the recommendations of the State Plant Board.

Moved, seconded and carried that the resolution be adopted.

Question Box

Okle Painter Williams, Secretary

It has been the custom of the Society for several years past to introduce at their first meeting a Question Box which is for the use of members who would like to ask questions and have them answered from the floor.

The following are the questions found in our box:

Question No. 1. Hardwood ashes exposed to rain, will stand how much rainfall and still be valuable? In other words, how much water will it take to leach all the potash out of hardwood ashes.

Mr. Hume: I don't believe the question can be answered definitely. Will anyone undertake it?

Mr. Stevens: I cannot answer that question exactly, but I can tell you something partly parallel. One of the large sawmills that have been burning slabs and sawdust, had a big pile of ashes which had been undisturbed for a year or two, through all sorts of weather. Recently the owner of this ash pile wondered if it was any good, so he sent a sample to the State Chemist and the analysis showed it was a little over one per cent. of available potash. In that instance the pile of ashes exposed to the elements for a year or two still possessed one per cent. of available potash even when it was pine ashes instead of hardwood.

Mr. Thompson: What is the normal analysis of pine ashes?

Mr. Heimberger: I have analyzed samples of pine ashes which would run over 7 per cent. but I would judge they were burned under unusual conditions and, of course, not leached. I believe the Department of Agriculture shows samples that had been burned under laboratory conditions that showed higher than that.

Mr. Hume: I suppose under ordinary conditions, they would not be over 1 per cent or 2 per cent, possibly.

There is an answer to this question written on a card signed by Supt. Trice of the Baptist Orphanage. "Four gallons of water to the bushel after the ash is well rotted."

Question No. 2. Does cutting through the bark of a grapefruit tree, stimulate it to bear?

Mr. Rolfs: Yes, and no. It depends on itself. If the tree is making too rapid or excessive growth, any mutilation will stimulate it to bear. If the tree is low in vitality, the further mutilation will deter it from fruiting, so it will be beneficial or detrimental to the tree according to the physical condition of the tree.

Question No. 3. Having harrowed weekly for several weeks until there is

no moisture within six inches of the surface, does it do any good to harrow more?

Mr. Thompson: I would say harrow right up to the very last, and keep harrowing.

Mr. Hume: I do not believe you can get a piece of ground so dry that moisture is not coming out of it.

Mr. Gaitskill: Has he been harrowing six inches deep; if so, what for?

Hr. Hart: Would it not be better and cheaper, after harrowing thoroughly, to use a weeder which would work three times as wide as an ordinary harrow and at the same time keep a light mulch on the surface that is needed.

Mr. Hume: If he has been harrowing six inches, it was too deep.

Mr. Shirley: It is necessary to harrow because the moisture is till coming out of the soil. If you let it get hard and compact on the surface it is going to go off. I should keep on at it even though the ground on top is loose and not compact at all. Keep something stirring on top, because there is still moisture below there.

Mr. Hart: There is moisture above, too. There is dew falling and as the earth cools off it is sucking in that dew and it is retained there. The dew oftentimes sustains vegetation where it is so dry there is no moisture, practically.

Mr. Hume: I know it has been so dry around some parts of the state this spring there is nothing to make dew of.

Mr. ——: How often should one harrow in dry weather when there is no rain?

Mr. Hume: Keep right at it and keep that moisture coming up. Once a week would be good advice. Harrow at about a week's interval.

Mr. Gillette: Let me tell you something I noticed during this dry weather. You may have noticed in a nursery where there are 8,000 or 10,000 trees to the acre lapping up the moisture, it is difficult to keep any moisture there at all. If you cultivate every week, that will help, but in digging trees during the last sixty days, I have been in the nursery and there did not seem to be a particle of moisture as far down as they went to get the tap root. I did not see how the trees lived.

But I also noticed, and my foreman called my attention to it, that where you dig a few trees, break the ground up around the trees where it has not been cultivated for three or four years, because you can't get to them, after these trees were dug, within twenty-four hours you go and stir the ground where you dug the tree and it is as moist as can be, showing that there is moisture there. You dig into those tree rows and break up that soil, and when you go back there next day you will be surprised to see how much moisture there is there.

We cultivate very shallow with an Acme Harrow. It does not go into the ground over an inch and a half.

Question No. 4. What is to be done with our unmerchantable or cull fruits?

Mr. Sample: That has been a perplexing question with the fruit growers of Florida ever since I have been here. It was a problem that was not solved in the Florida Citrus Exchange with Mr. Gillette as General Manager; we could not find an outlet for our culls.

Some three years ago a man by the name of Street undertook to solve the problem by preparing and preserving

grapefruit juice. He has succeeded so that now we are preparing and manufacturing a grapefruit juice that will keep indefinitely. He came to us at Haines City. (You need not smile; Haines City is on the map. I was asked when I came to Arcadia how the roads were. I came from Polk County, so I had no complaint to make.) (Laughter.)

The cull proposition could not be solved by the marketing agency. In conversation with Mr. Chase today he said he would be glad to dispose of his culls. Every grower in Florida has that question before him.

I believe we have solved the problem. When Prof. Rolfs was on the floor this morning I was tempted to state what we had accomplished, but fearing that the Society would think that was an advertisement, I refrained. But we have solved the problem locally. This year we will put up in the neighborhood of 10,000 gallons of juice, probably a little more, and we have found a ready outlet for it in the state.

We will manufacture some by-products into jellies, and marmalades, and we propose to prepare the rind in a marketable manner. I have put up a proposition to Prof. Rolfs how to utilize the seeds. This has not worked out yet, but I think it will be.

We made it profitable to the grower to dispose of his cull fruit. We propose this coming year to utilize at least 50,000 boxes of culls. (Applause)

Mr. Hume: I am certainly glad to hear that, Mr. Sample. It is a fine start in the right direction.

Mr. Sample: I might add that Mr. Street is a chemist and had had a good deal of experience in the west. He demonstrated to my satisfaction that he had perfected the process. He had worked on this proposition for three years. If you doubt it, go into a cold drink store in Florida and ask for Grapefruit Juice.

Mr. Gillette: Do you dispose of this entirely in Florida?

Mr. Sample. No, sir. A man recently obtained my address in Spokane, Wash. He immediately ordered one hundred and fifty cases of our juice and paid for it, to introduce it. Outside of that we have done little except in the state. Last week, our travelling representative told us we would have to pull him in or make more juice. (Applause.)

Mr. Gillette: I think that is a fine showing, to sell it here where we have plenty of the fresh juice on hand yet. Doesn't it stand to reason that in states where they have not the fresh juice, there is going to be a big demand? It seems to me this is something we have all dreamed about, and the consummation is in sight. If we can use profitably our second and third grade stuff and ship nothing but the first grade, it enlarges our market. I think this is something that should be followed up and Mr. Sample should be encouraged.

Mr. Rolfs: I am afraid Mr. Sample misconstrued my remarks. There are these loose elements, and Mr. Sample is bringing them together, but we do not have a state-wide and general movement along this one particular line. That is still before us. Mr. Sample has done well. Mr. Street has taken up with me the question of utilization of the seeds.

But I still say there is much we need to make a state wide development in-

stead of a local movement, commendable as such local movements are.

Mr. Hume: In other words, we want Mr. Sample to get so big that his project will cover the whole state.

I would like to ask Mr. Sample how many tons of seeds you have?

Mr. Sample: You can get a quart of seed out of about seventy oranges.

Mr. Rolfs: A quart of seed will weigh about two pounds. The question as to whether we can afford to work out the question of using the seed will depend largely upon the amount of the seed you have.

Mr. Sample: If we use 50,000 pounds of fruit next year, counting two pounds of seed to the box, that will be 100,000 pounds.

Mr. Rolfs: That, of course, limits the question very much as to the desirability of working into the question of disposition of the seed. You have the analysis of the seed as to the oil content, ash, etc. If you can extract only a few gallons of oil from the grapefruit or orange seed, it would be unwise to spend much time in the solution of the problem, if the state has to pay for it. You can readily see the logic of that, I am sure. If only a few gallons could be extracted, it would hardly be profitable when we have so many pressing questions to investigate.

Question No. 5. How stimulate growth of trees under which there is a stratum of hardpan?

Mr. Gardner: Dig up and move to another place. (Laughter.)

Question No. 6. Has the pre-cooling of vegetables been successful? What is the approximate cost of a plant large enough to pre-cool five cars a day?

Mr. ——: I should be able to quote you the exact figures, but I cannot. We have deemed it very profitable, however. We have about twelve cars of grapefruit in storage there now we are holding.

The plant is built in connection with the ice plant; the cooling room only belongs to the growers. The cooling room cost about $7,000.00. It holds about twelve cars and a per diem capacity of three or four cars.

The cost of cooling, as I recall it, is about 5c per box; 4c or 5c.

Question No. 7. Stable manure has been recommended to be applied on account of its probable bacterial action. Where stable manure is not available, can the prepared humus made in Florida be used in its place to good advantage?

Mr. Hume: There is a preparation being put out in Florida at this time known as Prepared Humus. I think the question pertains to that material. Prof. Rolfs, do you know anything about it?

Mr. Rolfs: No, I do not.

Mr. Hume: I have tried a little, but not enough to say or know much about it.

Mr. Rolfs: We have not had much experience with it. It is proprietary material and subject to change without notice, like a railroad schedule. We usually refrain from taking up any of the proprietary materials for testing out, for recommending, or otherwise. That is necessary in view of the amount of work we have to do.

I understand there is a certain amount of peat or whatever you wish to call it mixed with it; there is a certain amount of dried blood, a small amount of potash and a certain amount of stable manure

to enliven it and artificial cultures of bacteria.

Question No. 8. Is the bacteria in the prepared humus similar to that in stable manure, sheep manure, etc?

Mr. Hume: Of course it would be the same. I understand there is some blood in the material added to it for that purpose.

Mr. Hart: Two years ago I used some of it experimentally, and at that time they were not putting in the blood and the bacteria. He advised using a little stable manure with it to start the bacterial action. This I did. I put it into a grove where the trees are fifteen or twenty feet apart, and tangerines between them, so that the ground was shaded, and I have obtained a better crop from that grove than the average of my grove, considerably better. I had a larger crop of grass right in the dense shade than I had on the other grove. I was sufficiently encouraged to use it again the next year, and then it was prepared with these other elements introduced in the peat. I am very well satisfied with it so far as I have gone, but I do not consider I have reached anything conclusive yet. I have stated simply the result of my experimentation.

Question No. 9. What is the latest achievement in producing a covering for waterproofing pruning wounds on citrus trees; permanency, elasticity, economy of application all being considered?

Answer. There are quite a number of different trade brands of waterproofing paints recommended by tree surgeons. I have not used any of these special makes. I use simply a good floor paint or a good house paint. If this is used rather carefully no serious difficulties arise. Especially is this true if linseed oil is used in mixing up the paint.

Question No. 10. What method and periods of pruning each of the following species of citrus fruits are at present considered most advisable — Grapefruit, Oranges, Limes, Lemon, Kumquats, Mandarins? What groups could be treated alike?

Answer. Grapefruit and oranges should be pruned in essentially the same way. Never prune for the simple sake of pruning. We never take medicine without knowing what we are taking it for. In grapefruit and oranges, prune out all dead, diseased, and all weak wood, then shape the tree up to your ideal. Limes are not sufficiently understood to enable us to give any definite general direction for pruning. Lemons require special methods of pruning, but these methods have not been worked out fully for Florida. Kumquats, Mandarins and Tangerines need careful attention in the way of pruning, more so than do grapefruit and oranges. They produce a great many more sprouts and sprigs and are likely to become too bushy. This can be avoided by removing the weakest portions and shaping the tree.

Question No. 11. What is considered the most satisfactory legume to be planted in citrus groves, (especially reference to Dade County) and how should this be turned back into the soil without injury to the roots, or forming an acid condition in the soil?

Answer. Cowpeas are quite satisfactory to use in Dade County as a soil improver and a soil renovator. Velvet beans are likely to cause some annoyance

or trouble on account of their rank growth. They are also undesirable in bearing groves, since they are the breeding place of many plant bugs, which are likely later to migrate to citrus trees and cause fruit dropping. Beggarweed is an excellent legume, but unfortunately does not prove as frequently successful as do cowpeas and velvet beans. There are a number of new legumes that have been introduced in recent years, but these have not been sufficiently tried to warrant general recommendation.

Question No. 12. Has the practice of pruning out all water sprouts forming on healthy trees and of furthermore pruning out every vestige of growth from the inside of the tree, leaving an outside shell of foliage to support the tree and fruit, sufficient to recommend it?

Answer. Pruning out as stated in the above inquiry is inadvisable, unless there is some special reason not generally met with for doing the work that way. Rub off the water sprouts when they are still young, then get as much foliage on the interior of the tree as possible. The more leaves the tree contains the larger is its capacity for breathing and digesting, and the larger is its capacity for supporting the fruit crop. Two leaves will do twice the work of one leaf.

Question No. 13. Would like to hear reports on experiments with Spineless Cactus.

Answer. Spineless Cactus has been disappointing in a good many experiments. It has not held up to the claims of the introducers.

Question No. 14. What is the best method of getting rid of Salamanders (Pouched Gophers)?

Answer. Salamanders (Pouched Gophers) can be trapped with an ordinary steel rat trap or may be poisoned by using arsenic or strychnine dusted on tubers, either sweet or Irish potatoes. Tablets are also sold by some druggists for poisoning the "gophers." They are very annoying pests, but can be subdued by a systematic campaign.

Question No. 15. Has the pre-cooling of fruit and vegetables been successful in Florida? What is the approximate cost of a plant large enough to pre-cool five cars a day?

Answer. The experiments in pre-cooling of fruit and vegetables were quite successful. For full information write for publications to the Bureau of Plant Industry, Washington, D. C.

Question No. 16. Can Castor Beans be made profitable crop in this State?

Answer. At the present price of Castor Bean seed, it is quite probable that they could be grown profitably in Florida. Before the European war it was impracticable for us to compete with the cheap labor of India, where the Castor Beans are grown in large quantities.

Question No. 17. Is it injurious to orange and grapefruit trees to cultivate closely around their trunks?

Answer. It is injurious to orange and grapefruit trees to mutilate the roots, either by tearing them out or by barking them, or to bark the trunks or limbs. Any cultivation that can be carried on without injuring the feed roots or bark of roots, or bark of the trunks, or injuring the top, may be regarded as beneficial when done at proper times. Generally speaking, the branches of the grapefruit and orange trees should be so low

to the ground that it would be impracticable to cultivate near the trunks.

Question No. 18. How would you treat a newly cleared five acres, bordering on a lake, to prepare it for citrus planting? Contains some muck land which is to be used for vegetables and ornamentals, shrubs and flowers. Should it be limed and about how much per acre? Should it be limed before planting cover crop? Would cowpeas or velvet beans make best cover crop?

Answer. Velvet beans will give a much larger humus crop than cowpeas or beggarweed. They will also have a much more beneficial indirect effect than will the cowpeas. On the other hand a crop of cowpeas can be matured in sixty to seventy days, while it takes from four to six months to mature a crop of velvet beans. Lime is beneficial to legumes. It causes a large increase in the nitrifying nodules. In a few cases we have had an apparently detrimental effect from lime on citrus groves.

Necrology

E. S. Hubbard and E. A. Wright

H. L. COE, Tampa, Fla.

Henry L. Coe died at the Gordon Keller Hospital at noon March 31st, 1916, after an extended illness. Mr. Coe was seventy-seven years of age. The deceased was the leasee of the Tampa Bay Hotel. He had resided in this state for the past twenty-three years. The remains were shipped to Middlefield, Conn., where there was a private funeral.

Starting in a brass foundry when a young man Mr. Coe saved his earnings and with the natural aptitude of a born financier invested them so that they brought him a fortune. He worked from the bottom of the ladder to great wealth, and was reputed to be a millionaire at the time of his demise.

Realizing that this state afforded him the greatest opportunities to invest his funds, Mr. Coe came to Florida while still a young man and invested his money in property around Bradentown. There he erected the beautiful Manavista Hotel, famed throughout the country as one of the best hostelries on the West Coast. After this he leased the Tampa Bay Hotel and transferred most of his estate to this city.

Mr. Coe retired from active business in 1891. Then he decided upon this state as an ideal place for his future home. Since coming to this city Mr. Coe and his wife have occupied the beautiful suite of rooms facing the park and river in the northern wing.

While his death had not been altogether unexpected, the many friends of Mr. Coe received a distinct blow when the news of his death became known.

The deceased is survived by a widow and three daughters, Mrs. Samuel N. Nicholson, of Providence, R. I., Mrs. Henry S. Lanpher, of Glen Ridge, N. J., and Mrs. John F. Searles, of Tryon, N. C. Mrs. Lanpher was with her father at the time of his death.

MRS. A. J. COLLINS, Sebring, Fla.

Mrs. A. J. Collins, died quite suddenly on January 16th, 1916, at Sebring, Fla. She was born in Nova Scotia in 1859, and came to Florida to make her home in 1914. Mrs. Collins was a world wide traveler and was greatly interested in tropical horticulture. She was also a great club woman and a great worker in sociology. She left no near relatives to mourn her loss.

ROBERT S. MOORE, Noami, La.

Robert S. Moore died during the year, but the Committee has been unable to get any details of his life.

He had, however, one of the finest orange grove properties in the State of Louisiana and was the means of furthering the orange growing in the lower Mississippi region.

HOWARD YORK STILLMAN, Daytona, Fla.

Howard York Stillman was born in Westerly, Rhode Island, and died in Baltimore, Md., on November 4, 1914, being fifty-eight years old.

After graduating from the Westerly high school he entered the Brown University, where he graduated in 1879. The following fall he entered the law school of Columbia University, where, in 1881, he received the degree of L. L. B.

For fifteen years he successfully practiced law in New York City. His health beginning to fail, he travelled a great deal, going around the world and several times to Europe. Deciding that Florida was the garden spot of the world, he made his home in Daytona, where he was interested in real estate and agriculture in all its branches, owning several orange groves and small farms.

In 1905 he married and is survived by his widow and one child, Ronald York Stillman.

Annual Reports

REPORT OF AUDITING COMMITTEE

Mr. President, Ladies and Gentlemen:

The Auditing Committee, as appointed, has examined the books of the Secretary and Treasurer and find them accurate and correct in all particulars.

F. M. O'Byrne, *Chairman*,
R. L. Goodwin,
Lawrence T. Dade.

REPORT OF SECRETARY

Life Members, 1	$ 10.00
Donation Account	101.00
Membership, 1917, 1	1.00
Reports prior to 1915, sold, 11	11.00
Reports sold, 1915, 146	146.00
Check received from Treas. Hart,	78.50
Express charges returned	.64
Members, 1916, 351	351.00
	$697.14

Dr.

Stationery	$ 2.95
Express Charges	1.96
Stenographer's Expense	76.50
Freight Charges	.96
Postage	106.77
Secretary's Salary	100.00
Printing bills	35.25
Miscellaneous	6.00
Checks to Treas. Hart,	366.75
	$697.14

Reported since beginning of meeting.

Life Members, 2	$ 20.00
Members, 1916, 196	196.00
Member 1917, 1	1.00
	$217.00
Bills in hand and unpaid	$52.75

Our Membership is as follows:

Members enrolled at beginning of meeting	351
Members enrolled during meeting	196
Honorary members	4
Life members	114
Total membership enrolled	665
Members in attendance	345
Members from Arcadia	17

REPORT OF TREASURER

1915	
Apr 15—To Balance on hand	$915.11
1916	
Mar. 28—Mr. and Mrs. Mendell's fees	2.00
Mar. 28—Miss L. N. Gilson's fee	1.00
Apr. 8—S. A. L. Officers fees	4.00
Apr. 24—H. N. Goodwin	1.00
Apr. 25—Check from Sec.	366.75
	$1,289.86

Cr.

1915	
Apr. 16—By Dr. L. H. Bailey	$208.00
May 27—Miss Ford, Stenographer	76.00
July 31—E. O. Painter Print'g Co.	550.45
1916	
Apr. 11—Mrs. Williams, Sec.	4.00
	$838.95
Cash on hand	$450.91

REPORT OF EXECUTIVE COMMITTEE

At a meeting of the Executive Committee held immediately following the close of the 1915 meeting the secretary was instructed to have 1200 reports printed.

At a meeting of this same committee held February 2nd, the date of the 1916 meeting was set for April 25th to 28th inclusive.

Owing to the fact that the Society had no place in which to keep a permanent library, the secretary was instructed not to add to the exchange list of the Society.

The preparation of the program was left in the hands of Chairman Rolfs, the president and secretary.

Report adopted.

Mr. Rolfs: I would like to say in connection with this report: We do not have to go out after our friends for money to print the annual report. According to the present understanding of our financial condition, we will not have to do that this year. In other words, we have such a large increase in the membership that our membership fees have been sufficient to print our annual proceedings. (Applause.)

I hope next year we may keep up the good work as we have in the last two years and continue to keep within our means and not have to ask our friends to help us out.

ELECTION OF OFFICERS

On Thursday evening, April 27th, 1916, the following officers were elected for the year January 1, 1917, to December 31, 1917:

President—H. Harold Hume.

Vice-Presidents—L. B. Skinner, W. J. Krome and S. F. Poole.

Secretary—Okle Painter Williams.

Treasurer—W. S. Hart.

Executive Committee—P. H. Rolfs, E. S. Hubbard and Ed. Scott.

SELECTION OF NEXT PLACE OF MEETING

Invitations for the next meeting were received from Fort Myers, Jacksonville, Miami, St. Augustine, St. Petersburg and West Palm Beach. The first ballot taken eliminated all but West Palm Beach and Fort Myers, and on a second ballot by a vote of 87 to 69, decided in favor of holding the next meeting of 1917 at West Palm Beach, Fla.

Resolutions

The following resolution was introduced by Mr. M. E. Gillett, chairman of the Legislative Committee:

WHEREAS, the members of the Florida State Horticultural Society are vitally interested in the welfare of the citrus industry, many of them directly by reason of their grove holdings and others indirectly, by reason of the importance of the industry, in the developments and prosperity of Florida, and

WHEREAS, in the raising of funds for the eradication of citrus canker by public subscription, in the work of securing the enactment of the Florida Legislature of the law creating a State Plant Board and the measure appropriating $125,000.00 for the fight on citrus canker and in the campaign to secure aid from the Federal Government for the further prosecution of the canker eradication work, the members of this Society have taken an active and influential part, and

WHEREAS, it is now certain, that no living man or group of men can accurately estimate the cost of carrying to a final conclusion this citrus canker eradication work or definitely determine the period of its duration and it is exceedingly probable that funds in addition to those now available will be required to complete the conquest of the disease, and

WHEREAS, the State of Florida not only is required by the interests of her most important single industry to stand behind the fight on citrus canker until it has been finally won, but also is under a moral obligation to do so in order to justify the Federal Government for the aid it has given and in extending further help as may be asked for, now therefore, be it

Resolved, by the Florida State Horticultural Society in annual convention assembled at Arcadia, on April 26th, 1916, that we regard it as incumbent on the next session of the State Legislature (provided citrus canker has not been eradicated) to appropriate such additional sums for citrus canker eradication as in the judgment of the State Plant Board may be necessary and we as individual members of the Society pledge ourselves to request from all candidates for members of the House of Representatives and State Senate in our respective counties and districts pledges to support such appropriation, and be it further

Resolved, that a committee of this Society be appointed and charged with the duty not only of securing a record of such pledges from candidates and notifying each member of this Society of same prior to the Primaries and General Election, but also of bringing before the next session of the State Legislature bills for the appropriation that may be needed in the further handling of the citrus canker eradication effort, and of taking all proper steps to secure their adoption.

Resolution seconded and adopted.

Resolution on motion introduced by Mr. Lloyd S. Tenney:

Mr. Tenney: Mr. Chairman, those of us who have been more closely associated with the demonstration work under the Plant Act, have been impressed with one thing, namely, that the only appropriation carried in the Act itself is not going to be sufficient to carry the demonstration work of the Plant Board as it should be carried in order to properly protect our interest. When the sum of $35,000 was suggested, and when we went to Tallahassee to ask for that sum, we thought it would be ample, but the development of the work has been so rapid and the fields of endeavor have broadened so widely that that sum is really not over fifty per cent of what we need to carry out our ordinary work that comes under the scope of the Plant Act. This, you understand, is entirely aside from the citrus canker work that we hope is more or less temporary, and is an annual appropriation that will go on indefinitely. Therefore, in order to meet the situation, we present the following resolution:

WHEREAS, The Florida Plant Act of 1915 is a law of unestimable value to the agricultural interests of the State, and

WHEREAS, it is very essential that the nursery inspection work, the Port Inspection work and the other departments of the administrative work be supplied with sufficient funds to protect the interests of the State properly, and

WHEREAS, the present annual state appropriation of $35,000.00 will not furnish sufficient funds to do this, therefore, be it

Resolved, that the Florida State Horticultural Society assembled in annual session, recommend to the State Plant Board that in their estimate to be prepared for and presented to the next session of our State Legislature, they increase the amount estimated for the administration of the Plant Act to a sum sufficient to carry out the provisions of this Law in a way that will protect the agricultural and horticultural interests of the State.

Resolution seconded and adopted.

Mr. Skinner: May I offer a resolution? It will not take but a few moments to pass this resolution, and it is one I think should be passed by this Society.

We have labored so long in Florida without adequate protection of our interests by law, and we have so lately come into possession of a body that is carefully looking after our interests, that I think we should recognize it.

Some weeks ago, before I came down here, I learned of the real thing this year that has made California fruit bring so much less than Florida oranges, and that is the brown rot, that attacks the California orange and has this year been so severe as to cause in some instances 30 per cent loss in the car. Any shipper of Florida oranges knows that means nothing in return to the shipper.

There is danger that the brown rot might be introduced in this State and I was interested to see whether our Plant Board would rise to the occasion and pass a law which would protect us from this danger. I am glad to say they saw the danger and quarantined citrus fruit from California and saved us from one more enemy. (Applause.)

I offer this resolution:

WHEREAS, this State has suffered in years past untold injuries from the insect pests and plant diseases which affect our crops, and

WHEREAS, the introduction of citrus canker has threatened with destruction a branch of horticulture in which our State is vitally interested, and

WHEREAS, the 1915 session of the Legislature of this State appropriated certain moneys and created the State Plant Board, and

WHEREAS, this State Plant Board is charged with the serious duty of protecting and safeguarding our horticultural and agricultural industries against the inroads and attacks of pests of various kinds; Therefore, be it

Resolved, that we express to the State Plant Board and to its officers and advisors, our deep sense of appreciation for the effective manner in which this work is being carried forward and to the State Plant Board in particular, for the self-sacrificing manner in which they have undertaken this large public task, without pay or remuneration; be it further

Resolved, that we pledge to the State Plant Board our active support in carrying out the work intrusted to its care, and be it further

Resolved, that the secretary of this Society is hereby instructed to forward to the chairman of the State Plant Board, the Hon. P. K. Yonge, Pensacola, Fla., a copy of these resolutions.

Mr. Chairman, I move the adoption of those resolutions.

Motion seconded and carried.

Final Resolutions

Mr. President, Ladies and Gentlemen:

We, your Committe on Final Resolutions, do hereby recommend the following resolutions for the consideration of the Twenty-Ninth Annual Meeting of the Florida State Horticultural Society:

That the Society express its warm appreciation of the many thoughtful evidences of hospitality which have been extended to its members by the citizens of Arcadia. We desire to mention especially the kindness of our hosts in providing transportation to and from the meetings, and in showing us in and around the city. The very excellent music and other forms of entertainment provided by the High School, the splendid building in which we have held our sessions, are features which we will not forget. We wish to thank the Commercial Club and the High School for their organized and efficient efforts to entertain the members of this Society during their visit here. We also desire to express appreciation to the newspapers for their courtesy to us.

To the railroads of Florida for special rates extended and for their co-operation, we desire to express our thanks.

For the papers contributed by various members of the Society and those otherwise provided by scientific workers, the Society is indebted.

Lastly, the Society wishes to express recognition of the services of the President, who has guarded the welfare of this body of horticultural workers during the past eight years.

EUGENE L. PEARCE,
ROLLAND E. STEVENS,
W. J. ELLSWORTH.

LIBRARY
Citrus Experiment Station
University of Florida
Lake Alfred, Florida

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